

DIETOTHERAPY

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NUTRITION AND DIET IN DISEASE

BY

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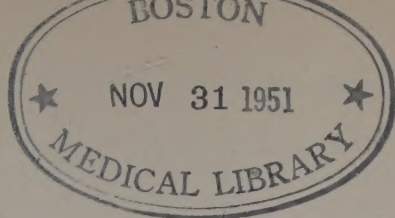
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DIETOTHERAPY

VOLUME III

NUTRITION AND DIET IN DISEASE

CHAPTER I

DIET IN DISEASE

More than fifty per cent of all illness that afflicts mankind near life's middle mile post, or further on, among the middle, well-to-do and the more affluent classes of society, is due to unpardonable and avoidable errors in diet.

Food as a Factor in Disease; Overeating; Diet as a Rational Means of Treating Disease; Use of Alcohol in Treatment of Disease; Duration of Gastric Digestion.

Views as to the treatment of disease have altered very considerably within a comparatively few years. Not so long ago, treatment was based essentially on drugs and the question of diet, if not altogether neglected, was not accorded the importance it is undoubtedly entitled to. At the present time, among a very large proportion of the members of the medical profession, medicinal agents are not regarded in the same light as formerly. Indeed, many distinguished authorities may almost be termed drug nihilists. Of these, Sir William Osler is the most conspicuous example. The medical profession then generally do not so highly esteem the treatment of disease by means of medicines as was once the case, having reached the conclusion that the most rational mode of preventing and treating disease is by careful attention to diet, hygiene and sanitation. *Mens sana in corpore sano* can only be achieved and preserved by eating wisely and in moderation; by taking plenty of outdoor exercise, and enjoying a sufficiency of rest.

FOOD AS A FACTOR IN DISEASE

In the prevention of disease, diet is of paramount importance. The old adage that the majority of persons "dig their graves with their teeth" contains more than the proverbial grain of truth. Overeating is probably quite as harmful as drinking too freely of alcoholic beverages and is much more common.

The chronic diseases which are so prevalent in these days are usually the outcome of overindulgence, both in eating and drinking and of dietetic errors. Diet then is a very prominent factor in the prevention of disease and the man or woman who is moderate in all things, including the consumption of food, stands the best chance of attaining a ripe old age.

However, the personal equation must always be considered. What is "one man's meat is another man's poison," and individual idiosyncrasies must not be disregarded. It is obvious, almost a platitude, that most of the diseases to which human flesh is heir, are influenced by the quantity and quality of the ingested food. Certain diseases actually are the direct consequence of improper diet. According to Gilman Thompson, this causative relation concerns, (*a*) insufficient food; (*b*) overeating and overdrinking; (*c*) food which is wholesome, but which is injurious because the ingredients are not properly balanced; (*d*) food containing animal parasites or their embryos; (*e*) food containing ptomaines; (*f*) food containing other poisons, grain poisoning, etc.; (*g*) food containing adulterants; (*h*) food containing microorganisms; (*i*) food which is itself wholesome but against which a personal idiosyncrasy exists; (*j*) alcohol as a food and poison.

Starvation resulting from a lack or inadequate supply of food has been described elsewhere in this work and marasmus, which may be caused by under-nutrition, will be dealt with later.

Overeating.—Overeating and overdrinking (Volume II, Chapter VI) may be temporary or chronic. When overeating is habitual it becomes gluttony, or it may be termed gluttony even if indulged in only at intervals.

Overeating, if continued for a long period will cause a variety of disorders and ailments, owing to the overloading of the alimentary canal, the accumulation of waste matter in the tissues, and the resulting imperfect oxidation.

If an excess of food is taken and especially if such food is indigestible and not properly absorbed, as is generally the case, fermentation follows

in the alimentary tract. Only a certain quantity of food can be digested in a given time; beyond this amount, food, of whatsoever description, will either undergo putrefaction or leave the body unchanged. Obstinate constipation. The taking of laxative drugs often becomes a habit, a overworking the digestive and intestinal organs. If the excess of food taken is absorbed, it enters the circulation, the excretory organs are worked at high pressure, and alimentary toxemia, with its deplorable sequelae is the result.

Chronic overeating is of course more detrimental than temporary overeating, and induces various diseases and more or less serious conditions, such as gout, lithemia, oxaluria, sometimes leading to the formation of renal, vesical and hepatic calculi. As in temporary excesses, long continued chronic overeating will produce so-called biliousness and habitual constipation. The taking of laxative drugs often becomes a habit, a vicious circle is established, which eventually results in the production of serious disorders.

Diet in Varying Living Conditions.—It is a matter of general knowledge based on common sense drawn from experience, that persons who live indoors and take little exercise, do not need the amount of nitrogenous food which is necessary to the active individual who lives in the open and takes plenty of exercise; especially does this apply to the man who does hard manual labor. Not only is much animal food unnecessary for those who lead a sedentary life, but it is positively harmful. Vegetables are better suited to the requirements of this large class of the community, because during the process of digestion they are converted into water and carbonic acid and are comparatively speaking, easily eliminated. On the other hand, the nitrogenous foods, in order that combustion may be complete, must be reduced to urea and allied products, which require a large consumption of oxygen, and produce forms of waste more injurious to the system than the carbohydrates. In default of sufficient exercise or hard work in the open air, the animal proteins in order to be properly digested and eliminated cause a strain on the functions of digestion, excretion and elimination, which in time interferes with the smooth working of the machinery concerned with the digestive processes. The many persons obliged to lead a sedentary life, by the exigencies of modern civilization, must be careful as to what they eat and drink, so as to maintain their mental and physical faculties at the maximum efficiency. The dweller in cities who of necessity leads the artificial rather than the simple life, must eat food most suitable for his mode of living. He must eschew animal food to a great extent and rely

mainly upon vegetable, in order to maintain intact his physical and mental powers and to lengthen his span of life.

Overeating, whether of protein or carbohydrate material, is injurious. Moderation in eating, as Cannon has proved, is conducive to good health. Taking more food than is necessary not only unduly taxes the digestive functions, but as Thompson points out, overworks the glandular and excretory organs and if the habit is persisted in, disease is bound to follow.

Overeating is the most common dietetic error and Thompson thinks that the foundation for more disease is laid by this habit than by overdrinking. With this view the author is in complete accord. There is little doubt that overeating combined with errors of diet, or errors of diet alone, are largely responsible for the great increase of the chronic diseases which is one of the most significant manifestations of civilized life. Chronic diseases are chiefly the outcome of injudicious and pleasurable indulgence at the table. In this connection diet bulks larger than alcoholic beverages.

Alcohol affects the nervous system more than any other part of the body and its harmful action on the organs connected with digestion has probably been exaggerated, therefore the situation should be judged somewhat differently from Thompson. As regards chronic diseases, we may say that overeating, and errors of diet generally are far greater causative factors than the use or abuse of alcohol. In the production of nervous disorders, alcohol undoubtedly plays a very prominent part. Briefly, overeating and the ingestion of unsuitable food are directly and indirectly responsible for much more disease than is usually assumed.

It can thus be clearly understood how important diet is in the prevention of disease. For if disease is so frequently caused by improper food or excessive amounts, it follows logically that by eating the right kind of food and with discretion gained by experience or by precept, much disease will be prevented.

Improperly Balanced Diet.—Several diseases are caused by food in itself wholesome but without proper balance. For example, anemia may be caused by lack of animal food; scurvy, by eating too much salt meat and fish and not enough fresh fruits and vegetables; rickets, by injudicious infant feeding; acne or eczema, by foods too rich in fats; constipation, by overeating or partaking of a too highly concentrated diet; rheumatism, in some of its forms, is possibly partly caused by an unsuitable diet and is certainly influenced in its course by the same means. Both pellagra and beriberi are food diseases. Food is directly responsible for certain maladies caused by parasites or their embryos

such as helminthiasis and trichiniasis. Persons have been poisoned by meat or game, by fish and shell fish, by milk, cream, ice cream and cheese, as well as by grain. All these diseases and their dietetic treatment will be discussed at length in their proper order.

Diet as a means of preventing disease, is of greater importance than diet in the treatment of disease, that is if we believe in the adage that prevention is better than cure. In the opinion of many authorities diet in the treatment of disease is more effective than treatment by drugs. Both forms of treatment have their place and should be employed in conjunction. Yet it may be emphasized that unless most careful attention is paid to the diet, the results in most cases will be doubtful or unsatisfactory. Some diseases are more dependent on diet for successful treatment, than on drugs. The issue in certain maladies rests almost entirely on diet, in other affections diet plays a more subsidiary, but still, an important part and again in other complaints diet, although never a negligible factor, is of secondary importance. The disregard of diet in disease is always a more or less serious mistake.

Authorities disagree as to the best alimentary regimen in the treatment of certain diseases. Our endeavor will be to present facts, to analyze to some extent the evidence in support of this or that regimen, but not to advance any dogmatic statements with regard to the value of any special mode of feeding for any particular disease. The most modern views, as advanced and expressed by those best qualified to speak with authority will be presented or quoted, so that the readers may draw their own conclusions.

Diet as a Rational Means of Treating Disease.—In the first place, it may be premised that diet and rest, speaking broadly, go hand in hand in bringing the sick back to a state of health. It is the rational way of treating disease, because it is, in effect, merely the attempt to assist nature to do its own work. It is the natural means of aiding the functions of the body to return steadily to a normal condition. An appropriate diet, in the majority of cases, will repair the losses of the organism induced by fatigue, the high temperatures of fever or dangerous chills, in a more effective manner than the administration of harmful stimulants. In properly dieting the patient, care must be taken not to overfeed. An appropriate diet is characterized by Gautier as a combination of foods which correspond to the triple indication of raising the strength of the body, producing the minimum of toxins, and making the organs coöperate in ridding themselves of poisons engendered by disorders of their functional activity. Such treatment can hardly be termed expectant, for

it is not abstention from interference, nor an abandonment of the patient to his fate, but it is simply aiding the injured or tired organs to revert to the normal, in nature's own way. Appropriate diet in disease may be likened to some degree, to the oil by which the parts of a rusty engine are lubricated and enabled to run again smoothly as before the breakdown.

Of course, it would be absurd to insist that diet is a panacea for each and every disease. Many things must be taken into consideration when prescribing a diet. For most diseases it is not practicable to lay down absolutely hard and fast dietetic rules. Diseases must be separated into distinct groups and experience has taught that certain forms of food are suitable for certain types of disease. The statement that experience has taught must be taken with reservation and it would be better to say that experience appears to have taught that certain kinds of food are suitable for certain types of disease. For with regard to diet in disease, iconoclasm has been evident during the past few years and many of our long cherished beliefs in the efficacy of a dietetic regimen for a particular malady have been overthrown or at least severely shaken.

PRESENT DIETETIC KNOWLEDGE.—In a general way, however, the kind of food which exerts a beneficial or curative action in disease is known with a greater or less degree of exactitude. At least we know what kind of food will increase the virulence or severity of a given disease. The physician should know the foods to be avoided in the treatment of certain diseases and although he may be somewhat in doubt as regards the most suitable diet, the knowledge that some foods are poisonous in certain conditions and therefore forbidden, is a valuable step in the right direction.

Our knowledge with respect to the dietetic treatment of disease has made rapid strides, and with but few exceptions, rules can now be laid down with a certain expectancy of good results. In the application of dietetic rules the personal equation must not be forgotten. As Gautier says, in every case we must take into account the disease itself, as well as the nature of the soil or disposition in which it develops, without forgetting the possible resistance of well-marked idiosyncrasies. The individuality of the sick must be even more carefully considered than that of the healthy. Exactly the same kind of food does not suit all alike. The question of feeding invalids calls for the same discrimination as the question of a choice of drugs.

Hutchison points out, that there is a somewhat lamentable lack of confidence and precision in the methods of administering diet in disease because the physiology of dietetics is still very far from being an exact

science, and we are constantly hampered in any attempt to establish exact rules. Again, the "personal factor", to which reference has already been made, is apt to upset our calculations and consequently the prescription of any plan of diet partakes more or less of the nature of an experiment. Lastly, it must be confessed that the loose way in which dietetic means are employed in treatment, when compared with the comparative exactitude and consistency with which drugs are prescribed, is due in no small measure to the lack of any proper system of instruction in the principles of dietetics in medical schools. The therapeutic value of diet in disease is as great, if not greater, than that of drugs; therefore it would be rational and advisable to instruct medical students as thoroughly in the principles of dietetics as in those of pharmacology.

There is a lack of agreement both as regards an increase or restriction of the diet as a whole, in cases of disease, among those who make a study of the laws of nutrition as to what constitutes a normal standard diet. This phase of the question has already been dealt with. Concerning the indications for the proper feeding of our patients, we are on firmer ground.

WEIGHT AND TEMPERATURE AS A GUIDE IN THE DIET.—The guidance afforded by body weight and body temperature can hardly deceive. Progressive loss of weight and persistent subnormal temperature, are fairly significant signs that more food is required. Wasting diseases are accompanied by loss of weight; neurasthenia and chorea, with subnormal temperatures. Clinical experience has proved that a fattening regimen can be pursued with absolute confidence in these circumstances. Hutchison remarks, that in adjusting a diet with this object in view, lopsided prescriptions should be avoided and the aim should be to increase all the nutritive constituents of the food rather than add to the consumption of any separate one. There is no better way of carrying this out in practice than by ordering the patient to drink milk. Hutchison is opposed, in a general way, to change of diet and believes that no change should ever be made in a patient's customary diet, unless there are definite reasons for so doing.

The diet may require modification either chemically, or what is of more importance, mechanically; in order to meet some disability of the organs concerned with the digestion and absorption of the food. In cases of dyspepsia or intestinal disease, a careful dietetic regimen is indicated and in certain cases of impairment of general metabolism, dietetic adjustment on broad lines is equally necessary. In fact, in many ways, we possess the power to alleviate or cure disease by varying the composition of the diet.

RULES FOR THE DIET IN DISEASE.—According to Hutchison, the following general rules may be laid down as useful to bear in mind when drawing up any plan of dietetic treatment:

(a) When prescribing a diet for a case of local disease, one must take care not to sacrifice the whole to the part. The organs are “members one of another” and one must not interfere with a patient’s general nutrition in the interests of any one of them. This rule finds its chief application in cases of dyspepsia. It is often better, even in the interest of his stomach, for a dyspeptic to endure a certain amount of discomfort after food rather than to lower his general vitality by too great abstemiousness. (b) No article of food should be forbidden unless one has a good reason for doing so. Observance of this caution will ensure the avoidance of arbitrariness in dietetic prescriptions and greater consistency in the practice of different physicians. (c) In acute diseases one should recommend; in chronic diseases, forbid. (d) Before recommending any article, find out whether the patient likes it, and whether it agrees with him. (e) If an article disagrees, it is generally better to reduce the amount in the diet than to cut it off altogether. (f) General and proposed changes of diet should be made gradually. (g) Always bear in mind the following aphorisms of three great physicians. “Such food as is most grateful, though not so wholesome is to be preferred to that which is better though distasteful.” (Hippocrates.) “More importance is to be attached to the desires and feelings of the patient than to doubtful and fallacious rules of medical art.” (Sydenham.) “Physicians appear to be too strict and particular in their rules of diet and regimen; too anxious attention to these rules hath often hurt those who were well, and added unnecessarily to the distress of the sick.” (Heberder.)

The feeding of patients suffering from acute and chronic diseases respectively, differs materially. A somewhat restricted diet is appropriate in the former, and the food should be easy to take, easy to digest and easy to assimilate. On the other hand, in chronic diseases, the diet varies practically for each disease and it is frequently essential to supervise its composition even to its special details. It must be borne in mind that the appetite of sick persons is usually capricious and that they are almost invariably fastidious regarding the character and preparation of their food. Consequently the alimentation of the invalid should be a matter of especial concern, his food of the best, pleasant to the senses of smell and taste, and if necessary, prepared with suitable condiments. While the appetite is, as a rule, a fairly good guide in the case of the sick, it must be borne in mind that it cannot always be depended upon and either too little or too much food may be taken. One should therefore be as familiar as is possible with the food requirements of patients. This question was discussed at length when considering the “Caloric Method of Feeding” (Volume II, Chapter VIII).

In the feeding of invalids, appetite is a fairly reliable guide, although too much dependence must not be placed on a subjective desire for food. Invalids often need food when they do not wish it, they may require kinds of food which do not appeal to them; often they are satisfied before they have eaten enough. Therefore, although it is well to consider the appetite, which is generally a good sign, it is also necessary to take into account its artificial stimulation or depression in the sick. Scientific means of feeding are indicated especially in the case of chronic invalids. Scientific knowledge qualified by common sense will go far in the judicious selection of appropriate dietetic treatment for the various ailments of the body. Chalmers Watson gives the following general rules to be kept in mind when framing a dietary, in disease.

(a) Directions should not be of a careless nature; all directions should be made specific and in writing. (b) The relation of the meals to rest, exercise and work should be clearly defined. (c) The quality and quantity of the fluid ingested may be as important a consideration as the solid constituents of the food. (d) Keep in mind that in many instances the patient is simply giving free play to his appetite; and all that is necessary is to get him to stop overeating. This may require a little tact. (e) Begin by cutting off some of the "extras" in the dietary. Tell the patient that these are bad for him. These may not in themselves be injurious, but as part of the whole they are throwing an unnecessary strain on the digestive functions. (f) The patient's previous experience of the food recommended should be investigated. Regard must be paid to any idiosyncrasy, if such really exists. (g) All meals should be taken slowly special attention being directed to efficient mastication of the food. (h) It may be advisable to make any radical change in diet slowly; a return to the normal diet should certainly be made gradually. (i) If you decide to put the patient on a special system of diet and more especially a restricted diet and a satisfactory result is not obtained within two or three weeks the diet is unsuitable and should be changed. (j) Keep in mind the season of the year with the patient's associated proclivity to over indulgence in certain articles of diet especially fruits. (k) The application of the pancreatic reaction in the urine is of value in indicating whether the sugars and starches should be especially restricted.

Use of Alcohol in Disease.—In considering the question of diet, the employment of alcohol in disease must be discussed. Some medical authorities reject the use of alcohol under all conditions and deny that it possesses any therapeutic value. The majority are agreed, however, that alcohol is of use in the treatment of certain diseases. Alcohol serves a useful purpose as a cardiac stimulant in syncope and in some cases of acute fever, as, for instance, enteric fever, and in pneumonia. Its value in pneumonia is exhibited in tiding the patient over a critical period and can be estimated by its influence on the pulse, the temperature and the

general condition. If the pulse is slowed thereby, the temperature lowered and delirium calmed, we may conclude that it is doing good. As Campbell points out in "Sutherland's System of Dietetics", unless there is distinct evidence that it is doing these things, it is best to withhold it, for it must never be forgotten that alcohol not only tends to poison the heart muscle but also to weaken the natural defences of the body against pathogenic bacteria. Alcohol should therefore not be administered as a matter of routine in these cases. Simple uncomplicated pneumonia does best without alcohol, and the same is true of acute bronchitis.

The main therapeutic value of alcohol is in chronic states of debility as in anemia, in the overworked, and in those exhausted by chronic suppuration, or by such diseases as influenza and malaria. Campbell thinks it is probable that in all such cases alcohol essentially benefits by stimulating appetite and digestion.

In fatal diseases, which are not likely to run a long course, such as carcinoma and many cases of phthisis, alcohol may often be given with advantage. If it soothes the incurable patient and gives him a passing sensation of well being, it should, in the opinion of Campbell, be given without hesitation.

The above views represent, perhaps, the opinions of a large proportion of the medical profession with regard to the use of alcohol. Its employment in disease is limited. It does not rank high as a medical agent.

Duration of Gastric Digestion.—Since we will take up "Diet in Diseases of the Stomach" in the following chapter it may prove profitable to review briefly the subject of the duration of gastric digestion which has been the subject of much research and experimentation. The consensus of current opinion admits some difficulties in definitely determining the exact period of time required for gastric digestion. Many competent physiologists hold that a mixed meal comprising the ternary food elements will require from three to three and one-half hours. Certain foodstuffs are known to be acted upon very little, if at all, in the stomach.

There are several factors which influence the duration of time required for gastric digestion, so that the normal time required will vary constantly even in the same individual in a state of health, for it depends upon the kind and quantity of food ingested, the time elapsed since the previous meal, the methods of cooking and the rapidity of mastication, the state of health and many other conditions mentioned in the present chapter.

Many admirable text books on physiology and dietetics contain tables showing the time (arbitrarily) in hours and minutes required for the

digestion of various foodstuffs. Such tables are necessarily inaccurate owing to the great variations produced by the character of the food, the time and manner of preparation, the condition of the digestive organs and personal idiosyncrasy.

The following table worked out by Beaumont on Alexis St. Martin is offered as perhaps the most trustworthy guide available. In his classical work "The Physiology of Digestion, 1833" he records his observations on St. Martin, who by the accidental discharge of his gun, was wounded in the stomach. The wound healed with a fistulous opening from the stomach to the abdominal wall, so that the stomach contents could be inspected. Beaumont for years studied the process of digestion on the living patient.

This table shows the mean time of chymification of different articles of foods, naturally in the stomach, and artificially, in the laboratory vial, on a water bath.

The proportion of gastric juice to food in laboratory digestion was calculated one ounce of the former to one dram of the latter. The bath of course was maintained at body temperature, and freely agitated.

TIME OF CHYMIFICATION

ARTICLES OF DIET	IN STOMACH		IN VIALS	
	How Prepared	Time	How Prepared	Time
		Hr. Min.		Hr. Min.
Rice.....	Boiled	1 : 00		
Sago.....	"	1 : 45	Boiled	3 : 15
Tapioca.....	"	2 : 00	"	3 : 20
Barley.....	"	2 : 00		
Milk.....	"	2 : 00	Boiled	4 : 15
".....	Raw	2 : 15	Raw	4 : 45
Gelatine.....	Boiled	2 : 30	Boiled	4 : 45
Pig's feet, soured.....	"	1 : 00		
Tripe, soured.....	"	1 : 00		
Brain, animal.....	"	1 : 45	Boiled	4 : 30
Venison steak.....	Boiled	1 : 35		
Spinal marrow, animal.....	Boiled	2 : 50	Boiled	5 : 25
Turkey, domesticated.....	Roasted	2 : 30		
" ".....	Boiled	2 : 25		
" wild.....	Roasted	2 : 18		
Goose, wild.....	"	2 : 30		
Pig, suckling.....	"	2 : 30		
Liver, beef, fresh.....	Boiled	2 : 00	Cut fine	6 : 30
Lamb, fresh.....	"	2 : 30		
Chicken, full-grown.....	Fricasseed	2 : 45		

TIME OF CHYMIFICATION—*Continued*

ARTICLES OF DIET	IN STOMACH		IN VIALS	
	How Prepared	Time	How Prepared	Time
		Hr. Min.		Hr. Min.
Eggs, fresh.....	Hard boiled	3 : 30	Hard boiled	8 : 00
“ “.....	Soft “	3 : 00	Soft “	6 : 30
“ “.....	Fried	3 : 30		
“ “.....	Roasted	2 : 15		
“ “.....	Raw	2 : 00	Raw	4 : 15
“ “.....	Whipped	1 : 30	Whipped	4 : 00
Custard.....	Baked	2 : 45	Baked	6 : 30
Codfish, cured, dry.....	Boiled	2 : 00	Boiled	5 : 00
Trout, salmon, fresh.....	“	1 : 30	“	3 : 30
“ “ “.....	Fried			
Bass, striped, fresh.....	Broiled	3 : 00		
Flounder, fresh.....	Fried	3 : 30		
Cat-fish, fresh.....	“	3 : 30		
Salmon, salted.....	Boiled	4 : 00	Boiled	7 : 45
Oysters, fresh.....	Raw	2 : 55	Raw, entire	7 : 30
“ “.....	Roasted	3 : 15		
“ “.....	Stewed	3 : 30	Stewed	8 : 25
Beef, fresh, lean rare.....	Roasted	3 : 00	Roasted	
“ “ “ dry.....	“	3 : 30	“	7 : 45
Beefsteak.....	Broiled	3 : 00	Masticated	8 : 15
“ “.....	“		Cut fine	8 : 00
“ “.....	Raw		“ “	8 : 15
Beef, with salt only.....	Boiled	2 : 45		9 : 30
“ “ mustard, etc.....	“	3 : 30		
“ fresh, lean.....	“		Masticated	
“ “.....	“		Entire piece	9 : 00
“ “.....	Fried	4 : 00		
“ old, hard, salted.....	Boiled	4 : 15		
Pork, steak.....	Broiled	3 : 15		
“ fat and lean.....	Roasted	5 : 15		
“ recently salted.....	Boiled	4 : 30	Masticated	6 : 30
“ “ “.....	Fried	4 : 15		
“ “ “.....	Broiled	3 : 15		
“ “ “.....	Raw	3 : 00	Raw	8 : 30
“ “ “.....	Stewed	3 : 00		
Mutton fresh.....	Roasted	3 : 15		
“ “.....	Broiled	3 : 00	Masticated	6 : 45
“ “.....	“		Unmasticated	8 : 30
“ “.....	Boiled	3 : 00		
Veal, fresh.....	Broiled	4 : 00		
“ “.....	Fried	4 : 30		
Fowls, domestic.....	Boiled	4 : 00	Masticated	6 : 30
“ “.....	Roasted	4 : 00		
Ducks, domesticated.....	“	4 : 00		
“ wild.....	“	4 : 30		
Suet, beef, fresh.....	Boiled	5 : 30	Entire piece	12 : 00
“ mutton.....	“	4 : 30	Divided	10 : 00
Butter.....	Melted	3 : 30		

TIME OF CHYMIFICATION—*Continued*

ARTICLES OF DIET	IN STOMACH		IN VIALS	
	How Prepared	Time	How Prepared	Time
		Hr. Min.		Hr. Min.
Cream.....	Raw		Raw	25 : 30
Cheese, old, strong.....	"	3 : 30	Masticated	7 : 15
" " new, mild.....	"		Entire piece	18 : 00
Oil, olive.....	"		Divided	8 : 30
Soup, beef, vegetable and bread	Boiled	4 : 00	Raw	60 : 00
" marrow bone.....	"	4 : 15		
" bean.....	"	3 : 00		
" barley.....	"	1 : 30		
" mutton.....	"	3 : 30		
Green corn and beans.....	"	3 : 45		
Chicken soup.....	"	3 : 00		
Oyster soup.....	"	3 : 30		
Hash, meat and vegetable.....	Warmed	2 : 30		
Sausage, fresh.....	Broiled	3 : 20		
Heart, animal.....	Fried	4 : 00	Entire piece	13 : 30
Tendon.....	Boiled	5 : 30	Masticated	12 : 45
".....			Entire piece	24 : 00
Cartilage.....	Boiled	4 : 15	Masticated	10 : 00
".....			Divided	12 : 00
Aponeurosis.....	Boiled	3 : 00	Boiled	6 : 30
Bone, beef, solid.....			Entire piece	80 : 00
" hog's, solid.....			" "	80 : 00
Beans, pod.....	Boiled	2 : 30		
Bread, white, fresh.....	Baked	3 : 30	Masticated	4 : 30
" corn.....	"	3 : 15		
Cake, corn.....	"	3 : 00		
" sponge.....	"	2 : 30	Broken	6 : 15
Dumpling, apple.....	Boiled	3 : 00		
Apples, sour, hard.....	Raw	2 : 50	Entire piece	18 : 00
" " mellow.....	"	2 : 00	Masticated	8 : 30
" sweet, ".....	"	1 : 30	"	6 : 45
Parsnips.....	Boiled	2 : 30	Mashed	6 : 45
".....	"		Entire piece	13 : 15
".....	Raw		" "	18 : 00
Carrot, orange.....	Boiled	3 : 15	Mashed	6 : 45
" ".....			Entire piece	12 : 30
" ".....			Raw piece	17 : 15
Beets.....	Boiled	3 : 45		
Turnips, flat.....	"	3 : 30		
Potatoes, Irish.....	"	3 : 30	Mashed	8 : 30
" ".....			Entire piece	14 : 00
" ".....	Roasted	2 : 30		
" ".....	Baked	2 : 30		
Cabbage, head.....	Raw	2 : 30	Masticated	12 : 30
" with vinegar.....	"	2 : 00	Shaved	10 : 15
".....	Boiled	4 : 30	Boiled	20 : 00
Peach, mellow.....			Cut small	10 : 00
" ".....			Mashed	6 : 00

Penzoldt, Reichman and Rubner have each conducted experiments to determine the duration of gastric digestion. The following table by the first named author(1) gives the duration of time required for ordinary portions of various foods to be digested and to pass out of the stomach. His experiments were conducted on normal controls determining his results by means of the stomach tube—in order to satisfy himself as to the exact progress of the stage of digestion. His records, reproduced below, show the actual time required for a given portion (quantity) of a certain food to leave the stomach.

RATE OF DIGESTION AND CALORIC VALUE OF DIFFERENT FOODS¹

LEAVE STOMACH IN 2 TO 3 HOURS

Food	CALORIES IN FORM OF			Total Caloric Value
	Protein	Carbo-hydrates	Fat	
400 c.c. (14½ ounces) boiled milk.....	57.4	78.8	137.6	273.8
100 grams egg, raw, poached, or omelette (about 2 eggs).....	51.7	2.1	112.5	166.3
100 grams beef sausage (3½ ounces).....	59.7	....	372.0	431.7
200 " sweetbread (7 ounces).....	229.6	....	0.4	230.0
72 " oysters (10 of moderate size)...	17.7	10.7	7.7	35.1
200 " whitefish (7 ounces).....	179.6	....	20.5	200.1
200 " shell-fish ".....	139.4	....	9.3	148.7
150 " asparagus (5½ ounces).....	12.3	12.3	....	24.6
100 " white bread (3½ ounces or 1½ slices).....	28.7	213.2	4.6	246.5
100 grams rusks.....	35.3	307.9	9.3	352.5
50 " biscuit (1¼ ounces).....	21.4	150.0	21.4	192.8

LEAVE STOMACH IN 3 TO 4 HOURS

Food	CALORIES IN FORM OF			Total Caloric Value
	Protein	Carbo-hydrates	Fat	
230 grams chicken (8¼ ounces).....	188.6	....	85.6	274.2
250 " lean beef (9 ounces).....	215.2	....	34.8	250.1
160 " boiled ham (6 ounces).....	157.4	....	535.7	693.1
100 " roast veal (3½ ounces).....	82.0	....	13.9	95.9
100 " beefsteak ".....	140.3	....	76.4	216.7
100 " salted caviare (3½ ounces).....	127.1	....	148.8	275.9
150 " coarse bread (5½ ounces).....	36.9	307.5	6.9	351.3
150 " boiled rice ".....	18.5	467.4	....	485.9
150 " boiled cabbage (5½ ounces)...	18.5	49.2	....	67.7

¹ Modified from Strauss, Zeit. f. diät. Therapie, iii, Heft 4, and based on the results of Penzoldt (Deut. Archiv f. klin. Med., li, 535, 1893), Hutchison, Food and Dietetics.

RATE OF DIGESTION OF DIFFERENT FOODS AND THEIR
CALORIC VALUE—*Continued*

LEAVE STOMACH IN 4 TO 5 HOURS

Food	CALORIES IN FORM OF			Total Caloric Value
	Protein	Carbo- hydrates	Fat	
250 grams smoked tongue (9 ounces).....	247.0	....	721.0	96.8
100 " smoked beef (3½ ounces).....	110.7	....	139.5	250.2
250 " roast goose (9 ounces).....	164.0	....	106.0	122.4
200 " salt herring (7 ounces).....	154.9	12.3	314.3	481.5
150 " lentil porridge (5½ ounces)....	153.7	332.1	....	485.8
200 " pease porridge (7 ounces).....	188.6	426.4	....	615.0

Our most trustworthy information on the duration of the process of digestion is derived from the experiments of Penzoldt on healthy men (2). His researches revealed the fact that the amount and consistency of food had a strong determining influence on the rate of digestion. The experiments of Beaumont already referred to are of no very great value because they do not record the amounts of food ingested.

When outlining a dietary the physician must survey all the different elements concerned in the processes of gastric digestion. It is obvious that the normal time to complete digestion will vary constantly, even in the same individual in a state of health, depending on the following conditions: (*a*) the thoroughness of mastication, complexity of food and process of its cooking; (*b*) the rapidity of deglutition; (*c*) the activity of the stomach; (*d*) the interval since the last meal; (*e*) the condition of the blood and nerve supply of the gastric mucosæ; (*f*) the activity of the contractions of the circular musculature of the stomach, which may either retard or hasten the rate of emptying the stomach contents into the duodenum; (*g*) the strength of the components of the gastric juice, its volume and the effect upon it of the food, neutralizing or not; (*h*) the rate of absorption; (*i*) habit; (*j*) idiosyncrasy; (*k*) the presence, absence, or excess of fats or other materials incapable of gastric digestion; (*l*) the diversion of the nervous energy normally required from digestive to other functions such as muscular work, and of the mental faculties disturbed by rage, hate, fear, etc.

Penzoldt has planned a series of four dietaries based on the length of time at which various foods pass out of the stomach, influenced, of course, by the method of cooking and active qualities of the food, and the motor

functions of the stomach. They agree with Von Lube's diet lists, but are more complete and exact. They are given below:

PENZOLDT'S DIET LIST

DIET I

(*About ten days*)

Food or Drink	Largest Quantity to be Taken at One Time	Method of Preparation	Specific Requirements	How to be Eaten
Meat broth.....	250 gm.....	From beef.....	Without fat, or not salted	Slowly
Cows' milk.....	250 gm.....	Well boiled or sterilized..	Entire milk (or limewater $\frac{1}{2}$, milk $\frac{2}{3}$)	If desired with a little tea
Eggs.....	1 or 2.....	Very soft, just heated or raw	Fresh.....	If taken raw should be stirred into the warm, not boiling, meat broth
Meat Solution....	30-40 gm.....		Should have only a slight meat broth odor	In teaspoonful doses, stirred in meat broth
Cakes (Albert biscuits)	6.....		Without sugar	
Water.....	$\frac{1}{2}$ liter.....		Ordinary water or natural carbonated water with a small percentage of CO ₂ (selzer)	Not too cold

DIET II

(*About ten days*)

Calves' brain.....	100 gm.....	Boiled.....	Freed from all membranes	Best taken in meat broth
Thymus (calf)....	100 gm.....	Boiled.....	Freed from all membranes	Best taken in meat broth
Pigeon.....	1.....	Boiled.....	Only if young, without skin, tendons and the like	Best taken in meat broth
Chicken.....	As large as a pigeon	Boiled.....	As above (no fattened chicken)	Best taken in meat broth
Raw beef.....	100 gm.....	Chopped fine or scraped, with a little salt	From the tenderloin....	To be eaten with cakes
Raw beef sausage.	100 gm.....	Without any additions...	Smoked a little.....	To be eaten with cakes
Tapioca.....	30 gm.....	Boiled with milk to make gruel		

DIET III

(*About eight days*)

Pigeon.....	1.....	Boiled with fresh butter.	One young bird, skin, etc.	Without gravy
Chicken.....	1.....	Boiled with fresh butter.	One young bird, skin, etc.	Without gravy
Beefsteak.....	100 gm.....	With fresh butter, half-rare (English)	From the tenderloin, well beaten	Without gravy
Ham.....	100 gm.....	Raw, scraped, fine.....	Smoked a little without the bone	With white bread
Milk bread (Zwieback or Frieberger pretzels)	50 gm.....	Crisped, baked.....	Stale, so-called rolls, etc.	To be carefully salivated
Potatoes.....	50 gm.....	(a) mashed, (b) boiled in salt water and mashed	The potatoes should be mealy and crumble on crushing	
Cauliflower.....	50 gm.....	As a vegetable boiled in salt water	Use only the flowers	

PENZOLDT'S DIET LISTS—*Continued*

DIET IV

(From eight to fourteen days)

Food or Drink	Largest Quantity to be Taken at One Time	Method of Preparation	Specific Requirements	How to be Eaten
Venison.....	100 gm.....	Roasted.....	From the back; should hang for a time	
Partridge.....	1.....	Roasted without bacon..	Young birds, without skins, tendons, legs, etc.; should hang for a while	
Roast beef.....	100 gm.....	Medium to rare.....	From good fattened cattle; beaten	Warm or cold
Filet of beef.....	100 gm.....	Medium to rare.....	From good fattened cattle; beaten	Warm or cold
Veal.....		Roasted.....	Back or leg.....	Warm or cold
Pike.....				
Shad.....				
Carp.....	100 gm.....	Boiled in salt water without any additions	All fish bones should be carefully removed	In the fish gravy
Trout.....				
Caviare.....	50 gm.....	Raw.....	Slightly salt, Russian caviare	
Rice.....	50 gm.....	Mashed, pushed through a sieve		
Asparagus.....	50 gm.....	Boiled.....	Soft, without any of the hard parts	With a little melted butter
Scrambled eggs..	2.....	With a little fresh butter and salt		
Omelet (Soufflé)..	2.....	With about 20 gm. of sugar	Must have risen well....	To be eaten at once
Fruit sauce.....	50 gm.....	From fresh boiled fruit, to be strained through a sieve	Free from all kernels and peel	
Red wine.....	100 gm.....	Light, pure Bordeaux....	Or some corresponding kind of red wine	Slightly warm

For example, if an additional 50 grams of roast meat is ingested, it will only increase by one hour the time necessary for complete digestion; an extra portion of biscuits, 50 grams, lengthens the duration of digestion by seventy minutes. It has been definitely determined that six times the original quantity of beef requires only three times the original length of time required for digestion.

A study of the period of time necessary for chymification of food-stuffs reveals the fact that the digestion of solids is influenced much more by consistence than by amounts. An increase in the quantity of food ingested prolongs, it is true, the duration of the ingesta in the stomach, but not proportionately. For the digestion of biscuits, four times the original quantity requires double the time, with fluids the original quantity can be increased five times, while the time for digestion will only be doubled.

REFERENCES

1. PENZOLDT. Deutsches Archiv f. klin. Med., 1893, pp. 57, 578.
2. ———. *Ibid.*, vol. li, p. 535.

CHAPTER II

DIET IN DISEASES OF THE STOMACH

ROBERT COLEMAN KEMP, A.B., M.D.

General Considerations.

Dietetic Treatment of Gastric Disorders: Achlorhydria; Achylia Gastrica; Acute Gastritis; Dilatation of the Stomach; Atony of the Stomach; Atrophy of the Stomach; Chronic Gastritis; Dyspepsias—Hyperacidity, Hypersecretion, Mechanical Dyspepsia, Cerebral Dyspepsia, Hepatic Dyspepsia, Duodenal Dyspepsia; Ulcers of the Stomach and Duodenum; Displacements of the Stomach; Nervous Affections of the Stomach.

Special Cures in the Treatment of Diseases of the Stomach; Vagotonia.

GENERAL CONSIDERATIONS

It is obvious that food exerts a great influence for better or worse on all derangements, disorders and diseases of the stomach. In the first place, many, perhaps the majority, of stomach affections have their origin in the abuse of food and drink. Overeating and overdrinking are the main causes and the ingestion of unsuitable food and certain beverages are potent contributory causes. Thus a large proportion of stomach complaints can be prevented by paying careful attention to the quantity and quality of food consumed, to proper cooking and to eating under favorable conditions. Americans in particular suffer from stomach disorders owing to their carelessness in selecting food and to their habit of eating too quickly—bolting food without thorough mastication.

Diet, when digestion has become disordered or even when disease has set in, can effect much in a curative direction. The selection of a diet in gastric disorder should have a scientific basis. One must know how the entire process of digestion and absorption goes on in health. This matter has been exhaustively considered in Volume I, Chapters V, VI, VII. However, it must be borne in mind that very little absorption takes place in the stomach, and although in many cases of impaired digestion it

would be very useful if the amount of nutriment absorbed in the stomach could be increased, little can be done in this respect.

Since intestinal digestion still has full sway the wisest mode of treatment is to give such food as will be most rapidly discharged from the stomach into the duodenum. Only in cases of pyloric obstruction—which is a surgical condition—is an increase of absorption in the stomach absolutely indicated. In addition, a knowledge is necessary of the secretory, absorptive and sensory powers of the stomach, as well as of the position of the organ. The presence or absence of gastropsis must be established in the particular diseased condition which it is desired to treat. A chemical examination of the contents of the stomach, of its size, and a close study from all possible aspects which suggest themselves, will generally afford a sufficiently clear knowledge of the existing conditions upon which an appropriate dietetic treatment may be based. The secretion of hydrochloric acid may be taken as a reliable index of secretory power and a deficiency or excess can be met with by a diet adapted to either condition. With regard to the treatment of inadequate motor power, the mode of preparation is almost as important as the choice of food. The object to be aimed at in this condition is a quick emptying of the stomach and to effect this, the consistency of the food must be considered.

Dr. Herbert Hawkins points out (1) that the sensory power of the stomach requires no estimation. If it is abnormal it is obtrusive and cannot be concealed. Consequently in some cases of gastric disorder, not necessarily severe in themselves, a secondary hyperesthesia of the gastric mucosa is engendered. In prescribing a diet we are then hampered by the fact that even easily digested foods produce pain and sometimes vomiting upon their entrance into the stomach. The normal unconsciousness of digestion has been lost and to restore it is a very difficult task. The sole hope in neurasthenia is to improve the general condition. This state, usually known as nervous dyspepsia, may develop without any previous illness or without any assignable cause. The subjects of this form of dyspepsia are, as a rule, women, and their condition may be such as to call for enforced feeding. A consideration of dyspepsias of this nature will be entered into more fully when the section on nervous diseases is reached.

Consideration of Teeth and Mouth in Diagnosis.—When treatment of the more common stomach ailments is in question, emphasis must always be laid on the fact, to which reference has been made before, that these ailments are in the majority of instances self inflicted, and that it is essential to correct errors of diet and of living if the treatment is to be

successful. The teeth especially must be the object of strict supervision. Physicians used to say "let me look at your tongue," but the up-to-date medical man is more apt to say "let me look at your teeth and mouth." The intimate relationship between the condition of the teeth and mouth and stomach disorders is being more and more recognized. While the state of the mouth and teeth may not be an absolute index of the condition of the digestive process, it still shows, from a diagnostic standpoint, which way the wind blows. Oral sepsis aggravates bad gastric and intestinal conditions. In fact, when the digestion is impaired and fermentation is present in the intestines, the state of the mouth and teeth is usually coincidentally unsatisfactory. Whether the mouth and teeth are most at fault, or the alimentary tract is the chief sinner, it is impossible to state with any certitude. This much is known, however, that a vicious circle has been established, and that a foul mouth acts prejudicially on the digestive functions and that these react injuriously on the mouth. Furthermore, it has been proven times without number, that when gastric and intestinal troubles exist, together with unclean mouth and teeth, the disorders of digestion are considerably ameliorated after the condition of the teeth has been corrected and the mouth rendered clean. The significance of good teeth and a clean mouth in their relationship to stomach affections is hardly even now appreciated by members of the medical profession. Gastro-duodenal ulceration has been imputed to oral sepsis.

Preliminary Period of Starvation.—In many cases of gastric disorder, presumably due to excess of food or improper food, many authorities recommend a preliminary period of starvation as the first necessity in treatment. Especially is this course advocated for persons of leisure, many of whom "live to eat" and "do not eat to live." For such as these to miss an occasional meal, to fast for one day in the week, or to pass one day in the seven on a sparse diet is excellent treatment.

Time of Chymification.—Leube has divided all articles of food into groups of digestibility by the ascertained time within which they leave the stomach in health. This, after all, though extremely useful to know, is somewhat too arbitrary an arrangement, and is not a satisfactory guide in the choice of food, for the reason that it is concerned chiefly with the motor power of the stomach and does not take into account so fully as it should, the state of the secretory function. It is useful to know, because a diet may be framed from the knowledge, but experience has shown that it is not applicable to all states of disease.

If one may be allowed a little moralizing in a work on diet, it might be interesting and perhaps instructive to point out, that hard and fast

rules based on experimental investigations and scientific research, often fail when put into actual practice. They ought to produce the effect expected, but they frequently do not, whereas a diet based on experience more often than not brings about the desired results. In health, persons have idiosyncrasies and certain likes and dislikes with regard to food and drink, and in disease these likes and dislikes are accentuated. Neither must these be disregarded, and it is always inadvisable, to put it mildly, to lay down rigid diet rules for a patient without considering the matter from all points of view. Diet lists at best are merely suggestive, and in stomach and digestive disorders and diseases in particular, as regards both kind of food and amount of food, they must be adapted to the patient.

Examination of Stomach Contents.—In all cases, wherever possible, examination of the contents of the stomach must be made. In detailing some of these tests we can do no better than to quote from Dr. Hawkins' paper already referred to:

Examination of the contents of the stomach must be made when possible. A few simple tests are at the command of all. Vomit may sometimes be used for the purpose, but a test meal is generally necessary. In ordinary practice, Ewald's test breakfast is most suitable, as it involves little discomfort. It consists of 60 grams of white bread with 350 to 400 c. c. of water or weak tea without milk or sugar, preferably water. In this every class of food is represented, viz.: protein, starch, sugar, fat, non-nitrogenous extractives and salts. It should be given in the early morning on an empty stomach and the residuum should be removed exactly one hour later. The contents of the stomach should then be from 20 to 40 c. c. of clear yellowish fluid when filtered. This test meal is especially useful when the question of the presence or absence of free hydrochloric acid arises.

To settle the question of delayed digestion and of hyperacidity, Riegel's test meal is more trustworthy. It consists of 12 oz. of soup, 5 oz. of beef, 1 1-2 oz. of mashed potato and a roll, with 8 oz. of water. It should be taken at midday fasting and after it the patient should remain at rest. Five hours later the contents of the stomach should be acid, and peptones should be present with some undigested muscle and starch. Seven hours after this meal the stomach should be empty or contain a little neutral liquid.

The fluid removed from the test breakfast should be acid. It should show free hydrochloric acid, but no lactic acid, and the total acidity should be between 40 and 60 on Ewald's scale. It should contain peptone and sugar, pepsin and rennin, but no starch or erythrodestrin.

The reaction may be tested with litmus paper, which is reddened by acid, free or in combination. That the acid is free, is shown if Congo paper is rendered blue or violet (filter paper saturated with a watery solution of Congo red 1-1,000 and dried). But this alteration is produced both by free hydrochloric acid and by organic acids, and the further test of Töpfer and Günzburg is necessary to distinguish between them.

Töpfer's is a dimethyl-amido-azo-benzol test. A few drops of a 0.50 per cent solution of this substance in alcohol gives a cherry-red colour to the filtrate or even to the unfiltered stomach-contents if free hydrochloric acid is present. A yellow colour is produced in the absence of free hydrochloric acid. It is true that a red colour is produced if as much as 0.2 per cent of lactic acid is present, but this amount of organic acid is rarely found and the test is generally efficient and certainly easy.

Günzburg's test requires more care. A few drops of the filtrate are evaporated slowly in a porcelain dish with a few drops of Günzburg's solution (vanillin 1, phloroglucin 2, absolute alcohol 30 parts). As it nears dryness, a red colour quickly appears along the edge. The evaporation must be slow and care must be taken to avoid charring. This test will demonstrate 0.05 per cent of free hydrochloric acid, not given by organic acids.

The presence of lactic acid, which is the organic acid of most common occurrence, may be shown by Uffelmann's test. If lactic acid above 0.01 per cent is present, the addition of a few drops of the filtrate will change the blue colour of Uffelmann's solution (carbolic acid 5 per cent 10 c. c., water, 20 c. c., liq. ferri perchloridi 2 drops) into a yellow or greenish-yellow. For perfect accuracy, when vomit and not the test residuum is examined, it is necessary to extract the filtrate with ether, evaporate, and use a solution of the residue in water.

The total acidity may be thus determined. To ten c. c. of the filtrate add two to three drops of a one per cent solution of phenol-phthalein. This is divided into two equal parts, and each part is placed in a beaker standing on white paper. To one part, decinormal solution of sodium hydrate (4 grams of sodium hydrate dissolved in a litre of distilled water) is added drop by drop until a red colour appears. The unused part serves for comparison. The total acidity may now be expressed by a figure (commonly 40-60) which represents the number of c. c. of the alkaline solution which are required to neutralize 100 c. c. of the filtrate. Thus, if 5.5 c. c. are required to neutralize 10 c. c. of the filtrate, the total acidity is expressed by the figure 55 on Ewald's scale, as 10 c. c. is one-tenth of 100 c. c.

The examination for combined HCl, for organic acids (other than lactic acid), for peptones, starch, sugar, erythrodextrin, and the methods by which the activity of pepsin and rennin, and the motor and absorptive powers of the stomach are estimated, should be looked up in a systematic work on the subject.

DIETETIC TREATMENT OF GASTRIC DISORDERS

The dietetic treatment of gastric disorders will now be discussed in detail, taking up in alphabetical order the ailments and diseases to which the stomach is subject.

Achlorhydria-Hemorrhagica Gastrica.—Achlorhydria-Hemorrhagica Gastrica is a condition characterized by the absence of hydrochloric acid in the gastric secretion. According to Robert Coleman Kemp(2) it is usually the result of reflex disturbance from disease of some other organ, or from some other primary disease. It is further characterized by the

presence of gastric erosions, with occult blood, mucus and a large number of organisms, most frequently streptococci, colon bacilli, or diplococci, in the gastric contents.

The symptoms are somewhat inconstant and capricious. Generally there is oppression or distress in the epigastrium amounting usually to a sensation of pain. This pain occurs in about one-third of the cases immediately after the ingestion of food, and is increased by acids. Sometimes the pain comes on later or even before meals. It is usually aggravated by taking food though it may be temporarily relieved thereby. Vomiting in particular relieves the pain, as do also alkalies and lavage. Nausea is frequent and hematemesis has occurred in a few cases. Constipation is the rule, and may alternate with periods of diarrhea of from one to four weeks' duration. The appetite is poor, and there is generally a loss of weight.

The diagnosis of achlorhydria is, as a rule, not especially difficult, as it generally results as a reflex from primary disease in some other organ. The absence of hydrochloric acid, the presence of occult blood, mucus and the large number of organisms, streptococci, colon bacilli, etc., in the gastric contents and the other peculiarities of these contents are pathognomonic.

DIET IN ACHLORHYDRIA-HEMORRHAGICA GASTRICA.—The diet is a very important part of the treatment. Milk with lime water or peptonized, kumiss, bacillae, fermillae, lactone buttermilk, gruels, broths and raw eggs beaten up with milk are indicated during the first few weeks. It is preferable at first to give nourishment four or five times daily. Later, soft boiled eggs, mashed potatoes, thickened gruels, rice well boiled and passed through a colander, scraped raw beef, stale toasted bread, etc., may be added. Fats, such as plenty of butter and cream, are necessary to increase the weight. Later, there may be a gradual return to a full diet of a simple type. Care with regard to food and drink should be exercised for some time. Acids cause pain on account of the erosions. Pickles, spices, alcohol and all irritating food material should be avoided. Smoking should be interdicted. Lobster, cucumbers, corn, sausage, hot breads and all indigestible food should not be eaten until complete recovery has taken place.

Chronic Achylia Gastrica.—Fenwick(3) first observed cases of complete absence of any demonstrable secretion of gastric juice, independent of chronic gastritis or gastric carcinoma, in connection with pernicious anemia, with an almost complete atrophy of the glandular apparatus of

the gastric mucous membrane. Numerous non-fatal cases have been reported, not associated with marked gastric symptoms.

Achylia gastrica, that is, persistent absence of hydrochloric acid, pepsin and rennet, may exist with only slight dyspeptic symptoms, or even with no gastric symptoms whatever. In all these cases, Strümpell(4) considers it wholly probable that digestion and absorption by the intestines is perfectly normal and completely replaces the digestive function of the stomach. The chief defect in these persons with achylia gastrica is that there is no gastric juice to act on the proteins. Putrefaction more readily occurs. Many varieties of bacteria are not destroyed by the gastric juice, though undoubtedly it is destructive to some. This explains why persons with achylia gastrica have a "sensitive" stomach and are prone to suffer from temporary dyspepsia. They very often, also, have a striking tendency to diarrhea. To confirm the diagnosis of achylia gastrica an examination of the stomach contents is necessary.

The term "achylia" is limited to a peculiar functional affection of the stomach in which the production of hydrochloric acid is absent, as are pepsin and rennet. Achylia gastrica may be a temporary functional disturbance or due to organic changes.

DIET IN ACHYLIA GASTRICA.—So long as the patient appears to suffer no obvious ill effects from the lack of gastric digestion, the diet should consist only of such foods as are calculated not to overdistend or embarrass the stomach, and to aid as far as possible the compensatory action of the intestine. Fenwick holds that the dietary should be taken every three hours. Light foods, such as milk, eggs, fish, sweetbreads, sheep's brains, and so on, may be recommended, while some farinaceous foods, for instance, rice, sago, tapioca, macaroni and mashed potatoes, occasion no discomfort. Raw vegetables and fruits, salads and tomatoes are contra-indicated, but well-cooked vegetables may be taken in moderation. Fenwick advises, if the appetite is deficient, that the various artificial foods which have undergone partial digestion may be given and that cod-liver oil and maltine are sometimes useful. Metchnikoff's sour milk often proves beneficial.

Severe cases of achylia which occasion extreme disturbance of nutrition need the most careful dietetic management. They should have such food as milk, soup, eggs and meat peptones. It is, however, self-evident that when there is actual atrophy of the mucous membrane, the results of treatment must be very limited. The milder cases of achylia do not need any treatment, except when special dyspeptic symptoms appear or when there is intestinal disturbance such as diarrhea; then the treatment is the

same as in ordinary disturbances of the stomach or bowels, including a suitable diet. If the symptoms subside, and there is persistent achylia,

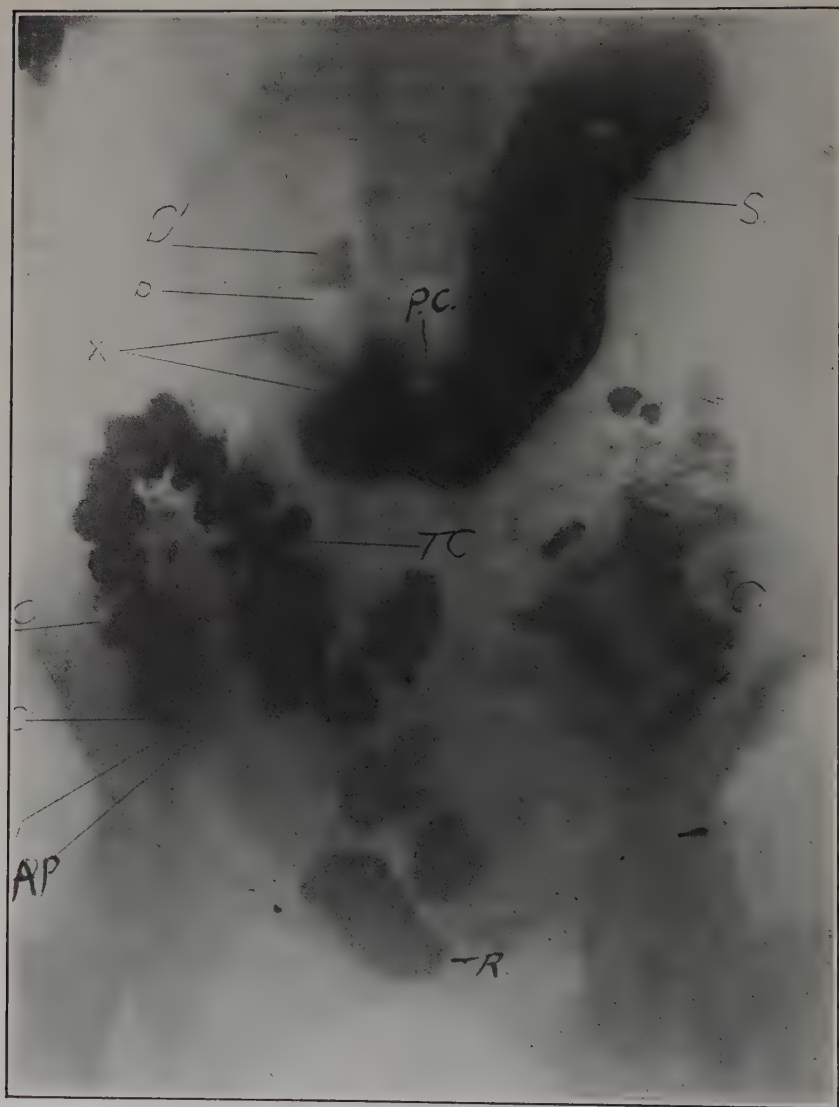


FIG. 1.—GASTRIC PERISTALSIS. Gastric peristalsis is manifested following the administration of a bismuth meal; this, when continued to the pylorus, ends in a persistent contraction of the pylorus, permitting but a small quantity to pass into the duodenum. The greater portion of the material in the pyloric end of the stomach is forced backward into the fundus. S—stomach, X—pyloric spasm, P—pylorus, D—duodenum, AP—appendix, C—cecum, TC—transverse colon, DC—descending colon, R—rectum, PC—peristaltic contraction.

of course a certain caution with regard to diet must be recommended. Too great a quantity of food at one time should not be taken and in general a largely vegetable diet should be chosen. If the achylia is associated with a dread of eating and a tendency to hypochondriasis, the patient should be encouraged to take a rather abundant supply of nourishment and employ hydrotherapy and other general tonics.

Beverages, besides milk, which may be allowed, include cocoa, weak tea or coffee, or, better, cereal coffee substitutes, and fruit juices. The use of alcohol in any form is interdicted, as should be the use of tobacco.

SUITABLE DIETARY IN ACHYLIA GASTRICA

<i>Breakfast—8 A.M.</i>		Grams	Calories	
Apple sauce.....	4 ounces	120	75	
Milk.....	6 “	180	125	
With cocoa or lactose.....	½ “	15	40	
Cereal.....	4 “	120	75	
With sugar.....	1 dram	4	25	
With cream.....	1 ounce	30	50	
Egg, poached, on toast.....	1 egg, 1 slice	80	150	
Bread and butter.....	1 slice	45	65	605
<i>Lunch—10.30 A.M.</i>				
Milk.....	6 ounces	180	125	
With lactose.....	½ ounce	15	40	
Graham crackers.....	2 small	8	10	175
<i>Dinner—1 P.M.</i>				
Cream vegetable soup or purée....	5 ounces	150	125	
Milk and lactose, as above.....	6 “	180	165	
Bread and butter.....	1 slice	45	65	
Bread or chocolate pudding.....	4 ounces	120	200	555
<i>Tea—4 P.M.</i>				
Milk, lactose and Graham crackers	As above	203	175	175
<i>Supper—7 P.M.</i>				
Potato or tomato bisque soup.....	4 ounces	120	75	
Fresh asparagus.....	1 ounce	30	25	
Raw cabbage salad.....	2 ounces	60	50	
Bread and butter.....	1 slice	45	65	
Milk and cocoa or lactose.....	As above	...	165	
Gelatin with cream.....	4 ounces	...	50	430
<i>On Retiring—9.30 P.M.</i>				
Milk, lactose and crackers.....	As above	203	175	175
<i>After each Meal</i>				
Olive oil.....	½ ounce	...	134	400
TOTAL NUMBER OF CALORIES.....				2,515

In a general way, the diet should consist of between 2,500 and 3,300 calories, a little more than the amount required in the average normal person. The best index of a proper diet is the patient's weight. In a debilitated, undernourished patient, an increase in weight is necessary; in no patient is loss of weight during treatment admissible. A good sample diet for a single day, consisting of 2,515 calories, is shown in the dietary previously outlined. By varying the nature and quantity of different constituents, such a diet can be made acceptable, or even agreeable, to the patient. Kemp holds that the higher caloric value, 3,300, is preferable. Starchy food is of particular value and membranes covering any such should be removed. Pea and bean soup, purées, barley, oatmeal, rice, sago and potato soups are useful. Plenty of butter, cream and yolk of eggs are indicated. Feeding at more frequent intervals, 5 to 6 times daily, in smaller quantities, is preferable to three large meals daily.

The use of hydrochloric acid and enzymes is a subject about which there is still considerable controversy. Probably the most valuable aid in relieving the symptoms of achylia gastrica is the use of hydrochloric acid. While this acid cannot of necessity be given in such quantities as to insure a concentration in the gastric contents even approaching the normal, its effect, even in small doses, is remarkable. The distress and sour regurgitation after eating are quickly relieved. Vomiting usually ceases at once and diarrhea has been always controlled within a few days, being often followed by obstinate constipation. The beneficial effects following the use of hydrochloric acid can be ascribed to the fact that its ingestion produces effects similar to those produced by the normal acid in the stomach, viz., a stimulation of gastric, intestinal and pancreatic secretion.

Acute Gastritis.—Acute gastritis is essentially a disorder in the treatment of which diet should play a very prominent part. Perhaps it would be more correct to say that while the inflammation of the mucous membrane of the stomach remains acute, lack of dietetic treatment should play the predominant part. In the more frequent form of acute gastritis the changes are almost entirely limited to the mucosa. This condition is therefore often termed simple gastritis or gastric catarrh, to distinguish it from the more rare and more severe inflammations in which the changes involve a greater depth of the stomach wall, as toxic gastritis and infectious gastritis.

The mild catarrhal forms are caused by simple chemical and mechanical influences and perhaps by thermic irritation. They are most often

the result of errors in diet, such as overeating, or of eating indigestible or highly spiced or acid foods. An attack of gastritis is more likely to occur if the food is bolted, either through carelessness, or on account of

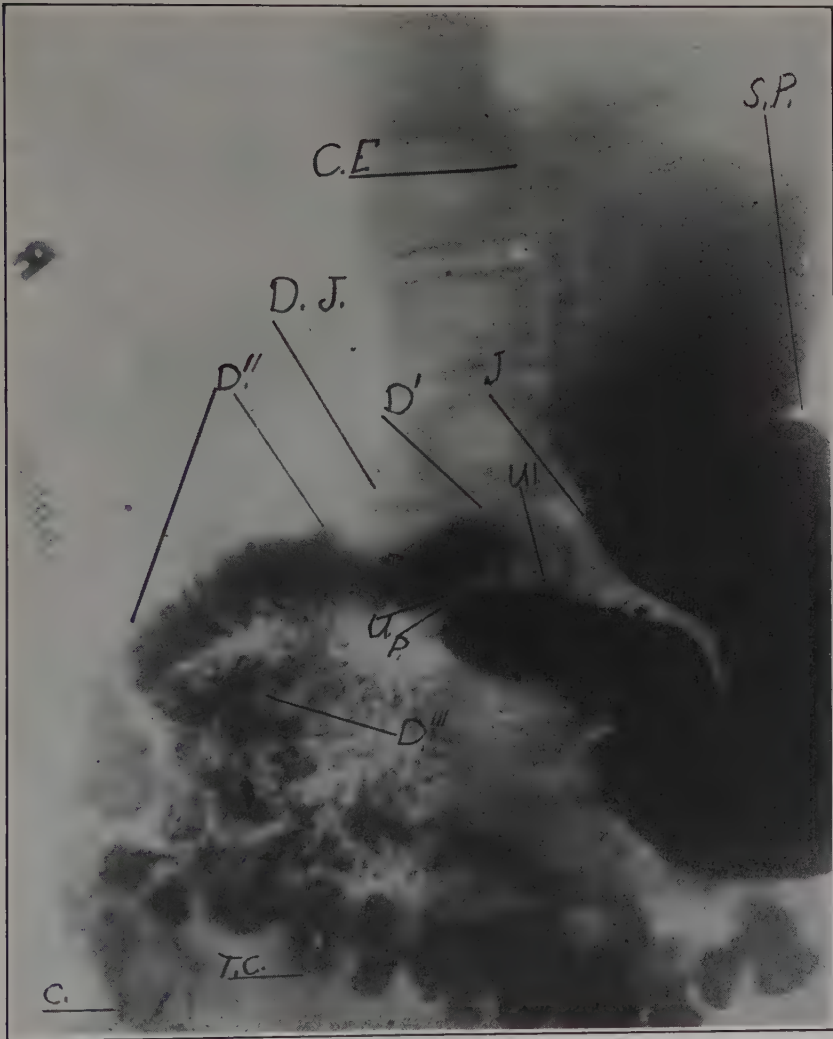


FIG. 2.—GASTRIC PERISTALSIS. This illustration shows a different type of gastric peristalsis from that of Fig. 1. The wave of peristalsis does not end in spasm of the pylorus, with the result that a large quantity of the stomach contents is discharged into the duodenum, marked D', D'', D'''.

defective teeth. In children this frequently happens. Too great an indulgence in ices is a fertile cause, and it is a common result of an excess of alcohol. The ingestion of decaying substances, as the incau-

tious use of tainted meat or fish may bring on an attack. The products of decomposition act as chemical irritants upon the mucous membrane; and the ferments and putrefactive agents continue their activity after reaching the stomach and thus contribute to produce the inflammation. Some people have a natural tendency to develop gastric catarrh on slight provocation and in these more particularly a regulation of diet is important.

DIET IN ACUTE GASTRITIS.—It is obvious that an inflamed organ requires physiological rest, and no better illustration of the elementary law can be given than that of an inflamed stomach. In acute gastritis the only sure means of effecting a speedy cure is by starvation, and accordingly no food should be administered by the mouth for at least twenty-four hours. As Fenwick has pointed out, in an adult this abstinence produces no ill effects, but in debilitated persons and children deprivation of nourishment is apt to increase the exhaustion produced by retching and vomiting, and thus it may be sometimes necessary to administer nutrient enemata composed of peptonized milk with a few drops of brandy. When thirst is intense, ice may be sucked occasionally or the patient may be encouraged to drink large quantities of hot water, with the view that it may act as an emetic and the stomach cleansed of its mucous contents by this means. As to exactly when food can be given with safety, opinions differ to some extent. Some think it is time enough to give food when vomiting ceases and appetite returns. On the other hand, it must be borne in mind that exhaustion will itself bring about anorexia as well as nausea, and that with the ingestion of food the latter symptom will frequently disappear. The common view seems to be that in twenty-four to thirty-six hours after the commencement of an acute attack of gastritis feeding may be resumed on a small scale, milk diluted (4 to 1) with lime water, soda water or barley water being tried at first. From this time on it is a question of graduated increase of food until a normal diet can be established. In the majority of cases, there will be no risk in feeding within forty-eight hours from the beginning of an attack, but should emesis occur, Fenwick recommends rectal alimentation. In such cases from 8 to 15 ounces of peptonized milk are introduced into the bowels by means of a rubber catheter and funnel. It is likewise advisable to give a rectal douche of normal saline solution night and morning in order to prevent irritation of the gut and to promote retention and absorption of milk. When the stomach is able to retain some food, iced milk with an equal quantity of lime water may be given in tablespoonful doses every hour for six hours, after which, if there has been

no vomiting, the dose may be increased to six ounces or more and the proportion of lime water gradually diminished. In severe cases egg albumin water, followed by iced whey, may be substituted for milk. Kemp recommends albumin water and 5 per cent gelatin solution, and small doses of milk—8 ounces soda bicarb.—grains \times , oxalate-cerium—grains \times , in divided doses, cooled in cracked ice. As soon as the nourishment is retained with comfort, the diet may be increased by the addition of clear soups, bovril, beef tea, toast and milk, lightly boiled or poached eggs and subsequently by fish, chicken, sweetbreads, scraped raw meat, lean ham, etc. Cooked meats and green vegetables should be prohibited for at least a week and the meats should be moderate in amount and taken at regular intervals.

According to Hawkins, the materials used at first should be milk with a decreasing amount of dilution, albumin water, the white of one egg stirred up in 10 ounces of water with a little salt, and whey. To all these a little brandy or sherry may be added if necessary. As a rule, on the fourth or fifth day carbohydrates can be added in the form of arrowroot, toast or rusks, and these with 30 ounces of milk, some of it preferably in the form of blanchmange, one or two eggs poached or slightly boiled or some beef tea or clear soup will form a sufficient diet.

DIETARY FOR ACUTE GASTRITIS—Friedenwald and Ruhräh

7 A.M.	Milk and lime water.....	150 gm.	101 calories
9 A.M.	Egg albumin with orange juice.....	100 "	53 "
11 A.M.	Broth with egg.....	150 "	84 "
1 P.M.	Milk with lime water.....	150 "	101 "
3 P.M.	Armour's soluble beef in water.....	5 "	10 "
5 P.M.	Egg albumin with lemon juice.....	100 "	53 "
7 P.M.	Milk in lime water.....	150 "	101 "

TOTAL CALORIES FOR DAY..... 503

After the third day the dietary is increased as follows:

7 A.M.	Milk (whole).....	150 gm.	101 calories
9 A.M.	Toast (dry).....	70 "	182 "
9 A.M.	Two soft-boiled eggs.....	100 "	160 "
11 A.M.	Bouillon with an egg.....	200 "	95 "
1 P.M.	Boiled rice (in milk).....	100 "	177 "
	Toast.....	70 "	182 "
3 P.M.	Egg albumin.....	100 "	53 "
	Crackers.....	50 "	187 "
5 P.M.	Whole milk.....	150 "	110 "
	Toast.....	70 "	182 "
7 P.M.	Egg albumin with orange juice.....	100 "	53 "

TOTAL CALORIES FOR DAY..... 1,583

About the third day, Boas recommends the following diet:

BOAS' DIETARY FOR ACUTE GASTRITIS (THIRD DAY)

8 A.M.			
	Milk with tea.....	200 gm.	157 calories
	Zwieback.....	50 "	230 "
10 A.M.			
	Bouillon with egg.....	200 "	100 "
12 M.			
	Toast.....	50 "	210 "
	Milk soup.....	200 "	100 "
3 P.M.			
	Milk.....	130 "	180 "
	Cakes.....	50 "	275 "
7 P.M.			
	Milk soup with rice.....	200 "	120 "
	Zwieback.....	50 "	230 "

Subsequent extensions by the addition of fish and chicken may be quickly made. At this point, if the origin of the attack is clear, final injunctions should be given as regards a healthy diet and the avoidance of future attacks.

Acute Toxic Gastritis.—Acute toxic gastritis is usually due to the ingestion of concentrated mineral acids or alkalies, so that actual destruction of the tissues of the stomach frequently exists. In this class comes poisoning from sulphuric acid, nitric acid, hydrochloric acid, caustic potash and caustic soda. Vomiting rarely removes all the poison from the organ and consequently, whenever possible, steps should be taken immediately to wash out the viscus. As soon as the stage of collapse is passed, the case should be treated like an acute attack of simple gastritis. Many cases of acute gastric catarrh, of apparently primary origin, are due to infection. Infectious catarrh of the stomach is especially apt to occur in the hot season. The precise nature of the pathogenic germ is not positively known, but various bacteria, especially streptococci, probably play a part.

In the toxic and infective forms of acute gastritis, both of which immediately endanger life, the problem consists in the maintenance of strength with abstinence from food over a much longer period of time. During the early days, rectal feeding in its most efficient form must be resorted to. Kemp points out that milk should be always peptonized for rectal feeding and that it is advisable to add salt, raw egg and dextrose. (*See* Volume III, Chapter XXVI.)

DIET IN PHLEGMONOUS GASTRITIS.—With regard to phlegmonous gastritis, the treatment is chiefly symptomatic, and is identical with that of other acute inflammations of the stomach. No food by the mouth is allowed, and the nutrition should be maintained entirely by large rectal injections of peptonized milk.

Dilatation of the Stomach.—According to Strümpell, who has studied this subject at length, dilatation of the stomach is not an independent disease. Many cases of well-marked dilatation with decided stagnation of the gastric contents may be referred to stenosis of the pylorus. There are, however, various degrees of gastric dilatation or muscular atony of the stomach which occur when there is no reason to assume any anatomical change at the pylorus. Such motor insufficiency must be suspected when there is a slight but distinct tendency for food to accumulate in the stomach. First, the diet must be regulated in treating this condition. Meals must not be too bulky, but nutritious and perhaps somewhat stimulating. Rye bread and small portions of vegetables and nourishing meat dishes are permissible in mild cases according to some. Large amounts of liquids at one feeding should be avoided, as they needlessly dilate the stomach.

ATONIC DILATATION.—With regard to atonic dilatation of the stomach, Kemp points out that this condition is often found among the insane. Unquestionably the habit of bolting the food common to such patients is a frequent cause of atonic ectasia. Among the acute melancholics, auto-intoxication, in some cases the result of ectasia with fermentation or putrefaction, was the primary factor in the production of the nervous symptoms. Even in the incurable insane, this atonic type of dilatation has a direct bearing on the symptoms. In a series of 13 paretics, examined by Dr. Kemp for the late Dr. Dent at the Manhattan State Hospital, he found eleven cases of atonic dilatation of the stomach and two cases of gastroptosis, and in all, secretory derangements of the functions of the stomach. Eleven of these cases had at some time of the day a temperature of 99.5° F. and upward. Under treatment directed to the gastrointestinal tract, the temperature was lowered in all; the convulsions, which were present in five cases, were diminished in frequency, and in one patient suffering from attacks of syncope, cessation of attacks followed treatment.

The atonic type of ectasia is quite common in many nervous conditions and is undoubtedly, in some, the cause of the auto-intoxication, the nervous derangement being secondary. Atonic ectasia is therefore apt to be the cause of nervous disorders. On the other hand, gastro-ectasia resulting from

insufficient mastication and bolting of food, in many nervous and insane persons, may be a factor in the production of a vicious circle. According to Kemp, beer drinkers and diabetics suffer from this type of dilatation. Professional men, bankers and brokers, from their irregular habits and rapid eating, are quite liable to this form. The musculature of the pylorus is much thicker than other parts of the stomach-wall, so that the latter naturally gives way and stretches more readily. Although this does not constitute a stenosis at the pylorus, ultimately the pylorus itself relaxes in these atonic cases, and this fact explains the usual absence of vomiting in these patients.

DIET IN DILATATION OF THE STOMACH.—The views held by Kemp regarding dilatation of the stomach are not altogether in accord with those of Strümpell. He does not entirely agree with the German authority in his views on *diet* in this condition. He draws attention to the fact that though some have recommended a so-called dry diet in dilatation of the stomach, it is well known that liquids are first evacuated from the stomach, then mushy food and finally solid food. This scientific knowledge should be our guide in feeding such cases. Water and food soluble in water leaves the stomach soonest of all. Although large quantities of fluid should not be given at one time, to guard against over-distention of the flaccid stomach, a considerable amount can be ingested in smaller quantities at frequent intervals. Alcohol, sugar and dextrin have been shown to cause a secretion of water in the stomach.

Milk is usually recommended as the standard diet in this condition, on account of its highly nutritive properties. It has been claimed that milk does not stay in the stomach much longer than plain water. Penzoldt has shown that water, cocoa, meat broth, soft-boiled eggs and boiled milk, 100 to 200 gm., leave the healthy stomach within one to two hours, cooking altering the curd formation. Raw milk requires a considerably longer period, and curds have often been found in the normal stomach two or three hours after ingestion. In experiments in Kemp's service at the Manhattan State Hospital, in cases of dilatation of the stomach, the periods during which raw milk remained in the stomach were investigated. After three hours large masses of curd were aspirated. When the milk was diluted one-half with water, the residuum found at a certain period was just one-half as much as when pure raw milk was used, which formed curds. The higher the dilution, the greater the quantity passed from the dilated stomach within a definite time. Another objection is that one liter of milk only represents about 640 calories, and too large an amount would be required for sufficient nutrition to be obtained from milk

alone. Strained soups and strained gruels are evacuated more rapidly. If milk be given, Kemp recommends its combination with some strained gruel, or gruel prepared with milk, so that the nutritive value may be increased.

In the severer types the diet suggested by Siebert in typhoid appeals strongly to us. It possesses considerable nutritive value and is as follows:

Strained rice, eight ounces, barley or oatmeal soup containing the extract of one-half pound of meat and the yolk of a fresh egg. This can be spiced slightly to improve the flavor. It can be given five or six times daily. Strained pea soup, lentil, tomato or potato soup can be used in addition. Rice flour is excellent in the form of a thin gruel and can be made with milk which has been thoroughly boiled. The object should be to give frequent, five or six smaller meals, so as not to overburden the stomach, and yet secure a sufficient amount of nutrition to improve the patient's physical condition. Two ounces of cream, in four ounces of water, possesses considerable nutritive value. Crackers heated thoroughly and well buttered can be rubbed up in the broth. Fat in the form of cream and butter should be administered. In the milder cases, scraped beef, soft-boiled eggs thickened with a small amount of mashed potatoes, rice strained through a colander with plenty of butter, can be given, with a little asparagus and spinach. Matzoon, kumiss, bacil-lac, kefir and milk prepared with lactone tablets are of special value for patients suffering from auto-intoxication, with nervous symptoms and indicanuria (intestinal putrefaction). The matzoon can be diluted with one-third water or Vichy that has been allowed to become flat, so as to prevent gaseous distention of the atonic stomach. About one quart of these preparations can be used daily, more water or Vichy, one-third in volume being then added. The sour milk preparations, especially with slight dilution, pass readily from the stomach. They do not curdle like plain milk. The yolks of several raw eggs, stale bread or crackers with plenty of butter and cream, strained vegetable soups, rice, gruel and somatose can be added. Meat preparations should be avoided in these cases. In cases with deficiency of hydrochloric acid, the meats are not well digested and should be given in smaller quantities; rice, barley and tapioca (strained) or in purées and mashed potatoes in large amounts are of service.

Kemp has often found raw eggs beaten up in water or milk of great service, employing at times six to eight daily. The milk can be completely or partially peptonized to lessen curd formation. If thirst is marked, rectal enemata of hot normal saline solution are indicated, and in very severe cases the stomach may be given a rest and nutritive enemata be given for a few days. After eating, Kemp recommends that the patient should lie down for from one-half an hour to an hour, preferably on the right side in order that the stomach may empty itself more readily. He strongly advises against the use of rye bread in cases of dilatation of the stomach.

Atony of the Stomach.—Fenwick(5) has drawn attention to the fact that atony of the stomach seldom occurs as a primary complaint, but is either associated with a similar condition of the entire digestive tract or ensues from inflammation or displacements of the stomach, fatty or lardaceous diseases of its muscular tissue or from an obstruction to the passage of food through the pylorus.

Under the head of atony, or motor insufficiency and dilatation of the stomach, belong numerous conditions which have this point in common that the stomach is not emptied within the normal limits of time. A secretory insufficiency is often associated with this abnormality; sometimes hyperacidity is present. Atony may exist without dilatation, but all cases of dilatation of the stomach are directly due to motor insufficiency, actual or relative.

Hawkins divides this group into three classes: 1. Pure motor insufficiency, gastric myasthenia, without dilatation, an impairment of the expulsive power, which results in an abnormal tarrying of the food in the stomach. 2. Dilatation without any pyloric obstruction. 3. Dilatation due to pyloric obstruction.

DIET IN ATONY OF THE STOMACH.—Fenwick has laid down the rule that the quantity of the food as well as the frequency with which it is administered must be adjusted to meet the requirements of each individual case. This is to say that in the dietetic treatment of atony of the stomach the personal equation must be always considered. Many authorities advocate an entirely dry diet and deprecate the use of any but the smallest amounts of fluid before or after meals. This régime is followed on account of the fact that liquids stagnate in the myasthenic stomach. Fenwick, however, is not of this opinion, and holds that as water is an important excitant of gastric secretion and when given in moderate quantities together with food stimulates peristalsis, it should not be withheld. Milk usually disagrees except when hyperacidity exists, and should be given only in small quantities. Neither tea nor coffee should be taken, but cocoa without starch may be allowed. Malt liquors should always be prohibited and wines are not well tolerated. Hawkins says alcohol should be entirely forbidden, as there is evidence to show that its absorption from the stomach is followed by a secretion of fluid into the stomach. The mass of evidence is apparently on the side of Hawkins, so that the employment of alcohol is contra-indicated in cases of atony of the stomach.

Food should be hot rather than cold, and a temperature of 110° to 130° F. is safe and useful. Meals should be small and frequent. During

DIETARY IN ATONY OF STOMACH WITH HYPOCHLORHYDRIA (Wegele)

		Protein	Fat	Carbo- hydrates	Alcohol
<i>Morning:</i>	150 gm. leguminose cocoa.....	6.0	4.0	13.5	
	50 " cream.....	1.8	13.3	1.8	
<i>Forenoon:</i>	1 soft-boiled egg.....	6.0	5.0		
	20 " zwieback.....	2.5	0.4	15.0	
<i>Noon:</i>	100 gm. scraped beef.....	17.1	6.0		
	200 " mashed potatoes.....	4.2	2.7	42.6	
	20 " malt extract.....	1.0		11.0	
<i>Afternoon:</i>	150 " leguminose cocoa.....	6.0	4.0	13.5	
	50 " cream.....	1.8	13.3	1.8	
<i>Evening:</i>	250 " tapioca pulp.....	12.0	8.0	11.0	
	15 " diastase malt extract..	0.8		9.0	
<i>During the day:</i>	50 " zwieback.....	6.0	1.0	35.0	
<i>Night—10 P.M.</i>	250 " milk.....	6.4	7.2	9.6	
	10 " cognac.....				6.9
	Total.....	71.6	64.9	163.8	6.9
	Calories.....	290	600	670	50
	ENTIRE NUMBER OF CALORIES.....			1,600	

DIETARY IN ATONY OF THE STOMACH WITH HYPERCHLORHYDRIA
AND NORMAL ACIDITY (Wegele)

		Protein	Fat	Carbo- hydrates	Alcohol
<i>Morning:</i>	150 gm. peptone, cocoa.....	8.0	6.0	7.5	
	50 " cream.....	1.8	13.3	1.8	
<i>Forenoon:</i>	30 " milk-toast.....	3.0	0.2	20.0	
	50 " ham.....	12.5	4.0		
	1 egg.....	6.0	5.0		
<i>Noon:</i>	120 gm. roast meat.....	21.0	8.0		
	200 " mashed potatoes.....	4.2	2.7	42.6	
<i>Afternoon:</i>	150 " peptone, cocoa.....	8.0	6.0	7.5	
	50 " cream.....	1.8	13.3	1.8	
<i>Evening:</i>	120 " cold roast meat.....	21.0	8.0		
	200 " rice.....	9.0	6.6	28.6	
<i>During the day:</i>	50 " zwieback.....	6.5	1.6	41.0	
<i>Night—10 P.M.</i>	100 " wine.....			3.3	7.8
	Total.....	102.8	74.7	159.1	7.8
	Calories.....	420	700	640	55
	ENTIRE NUMBER OF CALORIES.....			1800	

the early stages of the complaint, when food stagnation alone exists, a meal may be allowed every four hours, but when retention is present, five hours should be allowed to intervene between meals. Owing to the fact that digested food leaves the stomach in the shortest time, if it is readily convertible into semi-fluid or pultaceous form, green vegetables are excluded. When there is evidence to show that gastric secretion is normal, protein may be given freely, but meat should be finely divided and so slightly cooked as to be easily digested. Meat fat, fat bacon, ham and salad oil are all injurious, since they hinder the secretion of gastric juice and favor food retention. Cream and butter may be permitted in moderation. Sweetbreads and oysters may be given. Raw meat pulp often agrees when all other meats give rise to indigestion, and in certain cases may be pursued with advantage. Kemp holds that a food temperature of 130° F. is far too high; 120° F. is the maximum.

Lightly boiled or poached eggs usually agree unless some form of biliary or pancreatic disturbance exists. The white kinds of fish, such as whiting, sole, cod, turbot, plaice, haddock and hake, are preferable to the heavier oily varieties, like mackerel, salmon or herring. These should be boiled rather than fried. Smoked and dried fish are inadmissible. Tripe, sheep's head and brains, calf's head and feet, chicken, pheasant, partridge and tongue are all easy of digestion, but venison, duck, goose, pigeon, sausages, pork, veal, curries and meats twice cooked usually excite discomfort. Meat essences, powders and jellies may be given with impunity, but soups and broths must be omitted. Even in the milder cases, an hour of complete rest in recumbent position is recommended after the chief meals. (*See Volume III, Chapter XXVIII, for additional dietary.*)

In the first stage of treatment, Hawkins, of St. Thomas Hospital, London, advises rest in bed, and says: "Considering the great fall in the value of gastric digestion, one may be tempted to use the trade preparations of peptones, or rather albumoses, as calculated to take the place of protein. There is no doubt that such preparations can replace protein in the diet and that the nitrogen equilibrium can be thus maintained. But though such articles as somatose, Denayer's albumose pepton mixture and Carnrick's peptonoids may be used in some cases with advantage, especially when the food remains in the stomach until decomposition of protein occurs, it is better, as a rule, to depend entirely on intestinal digestion and to give such protein food as is quickly discharged from the stomach."

Kemp advocates the use of one-quarter to one-half pint of cream daily, six raw eggs and plenty of butter.

A diet to supply about 1,500 calories may be arranged as follows:

DIETARY AT BEGINNING TREATMENT OF GASTRIC DILATATION

8 A.M.	Milk 5 oz., 1 or 2 eggs, two pieces of thin toast with butter . .	422	calories
10.30 A.M.	Milk 5 oz. with plasmon, a rusk; 2 raw-meat sandwiches . . .	607	"
1 P.M.	Milk 5 oz.; fish cake or fish soufflé; custard; toast and butter	651	"
4.30 P.M.	Same as 10.30 A.M.	607	"
7.30 P.M.	Milk 5 oz.; 1 or 2 eggs, toast and butter	422	"
10 P.M.	Cup of arrowroot with cream	226	"
TOTAL CALORIES		2,935	

At a later stage the diet may be extended.

DIETARY IN DILATATION OF THE STOMACH WITH ANACIDITY
(Zweig)

		Serving	Grams	Calories
<i>Breakfast</i> —8 A.M.				
	Boiled rice	4 tablespoons	250	193
	Toast	2 slices	30	80
<i>Lunch</i> —10 A.M.				
	Eggs boiled	2	100	160
	Zwieback	2 pieces	20	75
<i>Second Lunch</i> —12 M.				
	Legumin soup	1 cup	240 c.c.	60
	Egg	1	50	80
<i>Dinner</i> —2 P.M.				
	Breast of chicken	Liberal helping	100	173
	Fresh vegetables	" "	30	40
	Fish	Medium "	50	54
	Toast	1 slice	20	70
	Milk	3½ ounces	100 c.c.	72
<i>Tea</i> —4 P.M.				
	Cocoa and milk	1 cup	240 c.c.	279
	Zwieback	3 pieces	60	113
<i>Supper</i> —7 P.M.				
	Tapioca pudding	6 tablespoons	110	344
	Scraped beef omelet	50 grams beef		
		2 eggs		
		10 grams sugar		
		10 grams butter		350
9 P.M.				
	Milk toast	1 plate.	150	287
TOTAL CALORIES FOR DAY				2,302

The following diet, supplying about 1,600 calories, is recommended by Wegele in gastric myasthenia, with reduced secretory activity:

DIETARY FOR GASTRIC MYASTHENIA

		Grams	Calories
<i>Morning:</i>	Leguminose cocoa.....	150	766
	Cream.....	50	185
<i>Forenoon:</i>	1 soft egg.....	50	80
	Toast.....	20	60
<i>Noon:</i>	Scraped beef steak.....	100	184
	Mashed potato.....	200	224
	Malt extract.....	20	20
<i>Afternoon:</i>	Leguminose cocoa.....	150	766
	Cream.....	50	185
<i>Evening:</i>	Tapioca pulp.....	250	480
	Diastase malt extract.....	15	20
<i>During the day:</i>	Toast.....	50	150
10 P.M.	Milk.....	200	144
	Cognac.....	10	40

In convalescence and for some considerable time after, the diet must be simple and sparse and slowly eaten. The amount of fluid should be small, 30 oz. being an ample allowance in the twenty-four hours in most cases.

Milk curdled by means of lacto-bacilline is, according to Fenwick, chiefly indicated when the disorder is accompanied by a notable deficiency of free hydrochloric acid, but it always disagrees when hyperacidity exists. When it agrees, half a pint should be taken twice a day for a period of three months. In the non-obstructive form of atony of the stomach with dilatation, the main object is to ensure a quick emptying of the stomach, and to rely on intestinal digestion. In the obstructive form, the aim is to ensure the best possible absorption of foodstuffs in the stomach itself. Peptonized and predigested foods are valuable for this purpose. Peptonized milk, somatose, panopepton, Benger's peptonized beef jelly, Valentine's meat juice, maltine and many other preparations are useful. The non-fermentable lactose should be substituted for other carbohydrates. Early mechanical support of atonic or dilated stomachs, particularly by the Roses belt, is indicated.

Atrophy of the Stomach.—Atrophy of the stomach invariably causes a diminution or actual suppression of the gastric secretion. A similar condition occasionally presents itself as a congenital nervous disorder. In both instances, the symptoms of indigestion which ensue from the disturbance of the gastric functions are intensified sooner or later by those of a secondary intestinal derangement. Of course the treatment of such

a condition varies greatly according to its causation. (*See* Volume III, Chapter XXVIII, for additional dietary.)

DIET IN GASTRIC ATROPHY.—When gastric atrophy is accompanied by pernicious anemia, meals should be taken frequently, at intervals not longer than three hours. Meat should be finely minced and thoroughly masticated. White meats should be given in preference to the red meats. Foods of a farinaceous character often agree, and such foodstuffs as rice, tapioca, sago, mealy potato, oatmeal and lentils may be employed in the preparation of soups and puddings. Soft-boiled and poached eggs are usually digested and may be given with bread or toast. When the intestines are in a healthy state, butter and cream are generally tolerated, but if milk is given it is best to peptonize it or dilute it with lime water. Beer and spirits must be prohibited, but sometimes a little white wine taken with the meals improves the appetite.

The general treatment and dietary of atrophy of the stomach due to chronic gastritis are similar to those employed in cases of that condition and will be discussed under the head of chronic gastritis. When atrophy of the stomach occurs as the result of the ingestion of corrosives, as mineral acids or caustic alkalies, the mucous membrane of the stomach is replaced more or less entirely by fibrous tissue and a chronic ulcer often persists in the neighborhood of the pyloric or cardiac orifice.

The diet in such cases (which are fortunately rare) should consist for several months almost entirely of peptonized milk, digested cereal foods, toasts, rusks, pulled bread, meat soups or essences thickened with vermicelli, rice or sago, eggs, raw meat pulp, chicken, cream, well-stewed tripe or sweetbreads. Fenwick, who has had a large experience in the dietetic treatment of gastric atrophy, says: "A pint or more of Metchnikoff's curdled milk is often a valuable adjunct to other forms of food; especially if much carbohydrate fermentation exists. Taka-diastase may be administered after meals, and if an artificial digestive is considered advisable, essence of pepsin, or papain, is preferable to the acid preparations. Failure of the general nutrition is very apt to be followed by acute pulmonary tuberculosis. Should intestinal compensation fail, it is held that an attempt may be made to stimulate the secretion of the pancreas by prosecretin or to assist its action by pancreatin or pancreatic emulsion."

Chronic Gastritis.—Chronic gastritis is necessarily a disorder of very frequent occurrence among civilized people. It is chiefly induced by over-eating, errors of diet, or abuse of alcohol and other beverages such as coffee and tea, which have a tendency to irritate the mucous membrane of the alimentary tract. This mode of indulgence if long continued will

bring about chronic gastric catarrh of a more or less obstinate character, even in persons with good digestive powers.

Strümpell holds that by far the most frequent, indeed, to speak more correctly, the only frequent form of chronic gastritis in adults is due to hard drinking. The habitual use of distilled liquors is more influential in this direction than excess in wine or beer. Of course, the harm done by alcohol may be greatly aggravated by other dietetic causes. Abnormal conditions of the mouth and neglected or carious teeth often lead to dyspeptic or catarrhal affections. Smoking to excess is an agent in the causation of chronic gastritis. There is little doubt that rapid eating and imperfect chewing lead to gastric disturbances. Hawkins points out that the term chronic gastritis was formerly used to denote nearly every form of chronic dyspepsia, but now that the great gastric neuroses and functional disorders are defined and separated, chronic gastritis, without losing in importance, has become a comparatively infrequent disease. It goes without saying, that prevention of chronic gastritis is more important than its cure, and therefore in order to guard against this possibly dangerous disorder, at least ordinary care must be observed as regards food and drink.

CAUSATIVE FACTORS IN CHRONIC GASTRITIS.—When the disease has become chronic, the original trouble should be detected and treated. With this end in view, we must consider all possible causative factors, as, for example, neglected or decayed teeth, improper ways of living and unhealthy occupations. A distinction can be made between a primary and a secondary form of chronic gastritis. As for the primary form, it is possible that repeated attacks of acute gastritis may lead to the chronic state, but this sequence is only met with when the acute attacks are due to alcoholic excess. The causes mentioned above will contribute proportionately to the establishment of the condition.

Secondary Chronic Gastritis.—Hawkins, of London, a man of large experience, has pointed out that secondary chronic gastritis is especially apt to occur in cirrhosis of the liver. Similarly it occurs as the result of the passive hyperemia due to cardiac failure and often turns the scale in the final stage of valvular disease. It supervenes occasionally in long standing cases of hyperacidity. Some degree of chronic gastritis is commonly present with carcinoma of the stomach. Finally, it may appear in various conditions of impaired health, such as tuberculosis, anemia and chronic nephritis. In the case of motor insufficiency and dilatation of the stomach, the same causes are concerned. Given the same vicious diet or habits, or the same enfeebled health, one patient may develop a chronic

gastritis and another a motor impairment and dilatation. It is not possible to separate these two conditions as sharply in practice as in theory. They may coexist.

DIET IN CHRONIC GASTRITIS.—The establishment of a suitable diet accordingly requires a knowledge of the state of the gastric secretion. As regards this point, four varieties are recognized by Boas: 1. gastritis acid; 2. anacida; 3. mucipara; 4. atrophicans.

Although chronic gastritis may occur as a result of hyperacidity, this is infrequent, for in chronic gastritis the secretion of hydrochloric acid is usually diminished. This acid deficiency and an increased production of mucus are, in fact, the main clinical features of the disease. In the atrophic variety, a late stage of great rarity, both combined and free acid may be absent and even the gastric ferments become scanty or cease to appear. In mild or in promptly recognized cases, the removal of the cause sometimes allows a return to health, though a short course of milk diet is usually necessary. In severe cases, it may be taken for granted that considerable changes have taken place in the gastric mucosa; consequently, the dietetic treatment will be a long and wearisome process. Half measures at this stage are of no avail; the patient must take to his bed and devote his entire attention to his cure. Acid gastritis, hyperacidity plus mucus, may be considered an early stage of the mucous type.

DIET IN CHRONIC GASTRIC CATARRH.—The direct treatment of chronic gastric catarrh must always begin with regulation of the diet. Such vague injunctions as "to be cautious" or "to avoid indigestible articles of food" are useless. The patient must have a perfectly definite bill of fare prescribed for him; nor can a universal table suitable for all cases be drawn up. In each individual instance, the special circumstances must be considered, and the personal experiences of the patient must not be disregarded. The personal equation predominates in these cases. It is impossible to formulate a definite scheme of diet applicable to all cases, since the powers of digestion and assimilation vary considerably at different stages of the complaint and in different individuals. The main object is to prescribe food of a quality and in such amounts as not to overtax an already enfeebled organ.

Fenwick agrees with Hawkins that when a severe case first comes under treatment, rest in bed for ten days or two weeks is indicated, and that the administration of some bland form of nourishment to afford immediate relief from the pain and vomiting will check emaciation and promote restful sleep. But before dealing especially with the dietetic treatment of severe cases, it will be well to consider Strümpell's mode of

dietetic treatment of chronic gastritis regarded from the broad point of view. In the first place, certain foods must be utterly forbidden to those patients who do not voluntarily avoid articles of diet which disagree with them. All articles must be prohibited which tend to irritate the gastric mucous membrane, either mechanically or chemically. Thus all the coarser sorts of vegetables or fruits containing a large proportion of indigestible cellulose and all dishes that are very sour, strongly salted or highly spiced, should be avoided.

Interdiction must likewise be placed on potatoes, farinaceous food and all substances composed mainly of hydrocarbons. Fat is also harmful, but we must not go too far in forbidding fats and starches. Emaciated patients need good butter and cream in cautious amounts. With respect to diet, the skill of the physician is often exhibited more in what he permits than in what he forbids.

The limitation or withholding of alcoholic beverages is an important point. Indeed the best authorities insist that in every severe case it is best to forbid alcoholic beverages entirely. In mild cases small amounts of beer may be permitted unhesitatingly, especially if the patient experiences no feeling of discomfort, but rather finds their use a spur to his appetite. For drink, besides water or seltzer water, very weak tea, cocoa, chocolate, and water reddened with claret are allowable. The use of coffee must be left to the discretion of the patient, as the best judge of its effect upon him.

According to Fenwick, in Latham and English's "Index of Treatment," in severe cases of chronic gastritis, as a rule, food should be administered every three hours and the fluid be restricted to half a pint on each occasion. If milk agrees, from three to four pints may be given in twenty-four hours, but if it produces discomfort, it must be diluted with lime water, sterilized or peptonized. In some cases the sour milk prepared in the manner recommended by Metchnikoff is an excellent adjunct to the usual diet, but ten days usually elapse before its good effects become apparent. Half a pint of the sour curds, well sprinkled with sugar, may be given twice a day. In severe cases(6), food in liquid and semi-liquid form, such as milk or matzoon with vichy, kumiss, bacillac, lactone, buttermilk, barley, oatmeal or rice soups prepared with milk; or chicken soup or bouillon, with raw egg beaten up, may be given. Somatose, plasmon or tropon can be added to the soups. Eggs, either poached or lightly boiled, clear soups, meat essences and jellies, junket, custard, cocoa made from the nibs, milk puddings, revalenta, arabaca, Gerrard's peptones, with toast, rusks and butter may all be taken.

Fenwick does not think that the rule to withhold proteins whenever the gastric secretion is deficient should be followed in cases of chronic gastritis, as the motor power of the stomach is rarely impaired before the terminal stage of the disease, while any diminution of protein digestion in the organ is amply compensated by an increase of the biliary and pancreatic secretions. Hawkins says that the digestion of protein is at a low level and that also carbohydrates are apt to disagree. Hence, while both protein and carbohydrate food should be added to the diet, both should be used in small quantities. The treatment throughout should be tentative and cautious.

The following is an outline of a suitable diet, taken from Sutherland's "System of Diet and Dietetics":

DIETARY FOR CHRONIC GASTRIC CATARRH

	Calories
8 A.M. Milk, 8 oz. with plasmon.....	357
10 A.M. Milk and egg.....	237
12 M. Beef tea, 6 oz.; or meat jelly.....	100
2 P.M. Milk and plasmon.....	357
4 P.M. Milk and egg or junket and cream.....	237
7 P.M. Benger's food, 8 oz.....	175
10 P.M. Milk and plasmon.....	357

Boas recommends the following diet at what he terms the second stage, that is, after the milk diet of 800 calories a day has been persisted in until the stomach is more tolerant of food:

DIETARY FOR SECOND STAGE CHRONIC GASTRIC CATARRH

	Grams	Calories
8 A.M. Milk and flour soup.....	200	358
Milk.....	100	72
Bread.....	50	135
Butter.....	30	240
10 A.M. 2 eggs.....	100	160
White bread.....	50	135
Butter.....	30	240
Or with this scraped beef.....	60	70
12 M. Farina milk soup.....	200	130
Milk and rice.....	200	185
Prunes.....	100	81
3 P.M. Milk and tea or coffee ($\frac{3}{4}$ milk).....	200	100
White bread.....	50	135
7 P.M. Rice and milk soup.....	200	150
Zwieback.....	50	130

Later Ewald's diet list may be followed in chronic gastric catarrh:

			Calories
8. A.M.	Tea, stale wheat bread toasted, or zwieback	150-200 grams	200
10. A.M.	Wheat bread	50 "	135
	Butter.....	10 "	80
	Cold meat or ham.....	50 "	150
	Milk, $\frac{1}{3}$ liter, or 1 glass light wine.....		170
2 P.M.	Water, milk or bouillon of white meats.....	150-200 "	25
	Meat or fish.....	100-125 "	150
	Vegetables.....	30-100 "	50
	Compote.....	80 "	...
4.30 P.M.	Warm milk or chocolate or milk and coffee (half and half), $\frac{1}{2}$ liter.....	$\frac{1}{2}$ pint	200
7.30 P.M.	Soup.....	300 grams	110
	Wheat bread	50 "	135
	Butter.....	10 "	80
10 P.M.	Occasionally 1 cup of coffee and 50 grams of wheat bread, biscuit or zwieback.		285

In a later stage, Hawkins recommends the final diet in dilatation of the stomach, such a diet to be maintained for a long time. Inebriates should be urged to become total abstainers. In selected cases, a glass of Rhine or Moselle wine may be permitted at lunch or dinner, but in no circumstances should alcohol be taken except with meals.

Wegele advocates the following diet, having a value of 2,400 calories, for chronic gastritis with impairment of digestive power:

DIETARY FOR CHRONIC GASTRITIS WITH IMPAIRED MOTILITY OF THE STOMACH

		Grams	Calories
<i>Morning:</i>	Pepton—cocoa.....	150	185
	Butter on toast.....	25	120
<i>Forenoon:</i>	1 soft-boiled egg.....	50	80
<i>Noon:</i>	Oatmeal soup.....	200	120
	Fowl.....	150	420
	Carrot.....	200	36
<i>Afternoon:</i>	Pepton—cocoa.....	150	185
	Butter and biscuits.....	25	120
<i>Evening:</i>	1 egg.....	50	80
	Scraped ham.....	100	400
	Macaroni with toasted bread crumbs.....	100	90
<i>During the Day:</i>	Wine.....	200	200
	Toast.....	75	225

After the first fortnight, when the patient is usually able to leave his bed, Fenwick allows a far more extended diet than the above. He says

that the most digestible articles at this period of the disease are as follows: calf's brains and boiled cod, whiting and plaice, oysters, scraped raw beef, tripe, sweetbreads, mashed potato, cauliflower, asparagus, toast, rusks, oatmeal, tapioca, sago, cornflour and rice, to which may be added boiled chicken, partridge or pigeon, well-stewed beef, boiled ham, calf's feet, sardines, spinach and stewed apple. If the case continues to progress in a satisfactory manner, the diet may be further enlarged at the end of another month by the inclusion of such articles as turkey, game of various kinds, underdone roast, mutton or sirloin of beef, lightly grilled chops or steaks and plain puddings. On the other hand, hard or coarse-fibered meats, pork, veal, sausages, lobster, salmon, mackerel, carrots, salads, celery, cabbage, cucumber, pickles, cheese, new bread, uncooked fruits and alcoholic drinks should be prohibited until the health has been completely restored.

Robert Coleman Kemp says that the mere estimate of requisite calories and feeding by this method alone is of no value, as each patient is a law unto himself. In severe cases give liquids and mushes.

The following diet is useful in many cases for a week or two, but must be modified to suit the individual.

KEMP'S DIETARY FOR CHRONIC GASTRIC CATARRH

		Calories
8	A.M. 1 cup of cocoa, about two-thirds milk.....	100
	1 lump of sugar.....	40
	2 soft-boiled eggs.....	165
	2 oz. zwieback, or toast or stale white bread (2 slices).....	150
	½ oz. butter.....	115
10.30	A.M. 8 oz. kumiss, matzoon or milk.....	168
	2 oz. crackers or somatose biscuit.....	150
	1 oz. butter.....	115
1	P.M. 2 oz. steak, chicken or chop.....	70
	3 oz. mashed potatoes or rice.....	130
	2 oz. white bread (stale) or toast or zwieback.....	150
	1 cup of tea about two-thirds milk.....	100
	½ oz. of butter.....	115
4	P.M. 7 oz. milk mixed with 1 oz. top cream.....	210
	1 oz. crackers.....	100
	½ oz. butter.....	100
6.30	P.M. 8 oz. hominy, rice or cereal boiled in milk.....	450
	2 scrambled or poached eggs.....	165
	2 slices of bread (average 2 oz.).....	150
	½ oz. butter.....	115
TOTAL		2,858

The author's experience in the dietetic treatment of chronic gastritis is that it is advisable for some days to have the patient at rest in bed and on a bland, easily digested dietary, which should consist exclusively of milk, two pints, diluted with one-third barley water, this to be the sole food for the first forty-eight hours. In view of the enfeebled state of the gastric secretions, often associated with vomiting, it is sometimes advisable to give the milk peptonized. If, for any reason, plain milk is objectionable, buttermilk or kumiss may be substituted. The diet should be fluid until the patient is able to take at least two pints of milk or its equivalent without discomfort, after which the dietary may be very cautiously increased. The addition of carbohydrates in any quantity tends to produce flatulence.

Later on, egg, whitefish and the breast of chicken, underdone meat, butter, toast and peptonized cocoa may be added. The necessity for keeping the diet exceedingly simple cannot be too strongly emphasized. All sugar, spices, condiments, alcohol, are forbidden. Tea and coffee are permitted only when used as flavoring agents. The following dietary should be maintained for some weeks:

SUITABLE DIETARY FOR CHRONIC GASTRITIS

	Calories
<i>Breakfast</i> —8 A.M.	
1 cup of peptonized milk.....	100
Dry toast and butter.....	200
<i>Forenoon Lunch</i> —11 A.M.	
1 cup of beef tea with hot milk.....	100
Dry crackers.....	150
<i>Dinner</i> —2 P.M.	
1 cup of chicken soup.....	70
Fish, chicken or tripe.....	75
Mashed potatoes.....	130
Stewed apples.....	30
<i>Afternoon Lunch</i> —4 P.M.	
1 cup milk tea.....	100
Dry sponge cake.....	150
<i>Supper</i> —7 P.M.	
Steamed fish, scrambled eggs or breast of chicken.....	160
Dry toast and butter.....	200
1 cup of hot milk.....	120
<i>Late snack</i> —9.30 P.M.	
1 cup beef consommé with milk.....	100
Dry crackers.....	100

After one or two weeks of this dietary, avoiding rich dishes, tea or coffee or other stimulating foods, the patient's condition should improve so that the dietary can be cautiously added to.

Kemp emphasizes the point that in the modern treatment of chronic gastritis, farinaceous foods are given, cream, butter, yolk of eggs, and especially raw eggs. In the aim to increase body weight, alcohol should be omitted, protein diminished, but he does not believe in the restriction of carbohydrates.

It appears from a consideration of the data supplied by those who have carefully studied the dietetic treatment of chronic gastritis, that a milk diet and rest in bed are indicated in severe cases and should be continued until the digestion improves, or is less easily upset, and the stomach becomes more tolerant of food.

After this stage, it seems that although a fixed diet is by no means applicable to all patients, since the personal equation must be always considered, yet more or less hard and fast rules should be laid down for a time. Alcoholic drinks, except in the strictest moderation, are contraindicated. As the lining of the stomach is in an irritated state, foods which will tend to aggravate this condition should be avoided. Avoid tobacco.

Dilatation of the Stomach.—Dilatation of the stomach may arise from several conditions, some of which have been discussed when dealing with atony of the stomach. It is therefore only necessary here to consider the dietetic treatment of acute dilatation and of that chronic variety due to pyloric stenosis.

Acute Dilatation of the Stomach.—Acute dilatation of the stomach is a very rare affection, and when diagnosed, must be promptly treated by lavage and postural treatment, no food to be allowed by the mouth until the size of the stomach has diminished and the pulse rate fallen. Should the dilatation prove more persistent than the average—twelve hours—Fenwick advises the administration of 10 ounces of peptonized milk with one-half ounce of brandy by the rectum. When the collapse has disappeared and the gastric dilatation has subsided, whey should be given by the mouth and the amount rapidly increased until 6 or 7 pints have been consumed in the twenty-four hours. The shrunken aspect of the patient betokens the necessity for giving him this large amount of fluid. Subsequently milk may be substituted for whey and the ordinary diet resumed.

DIET IN DILATATION OF THE STOMACH.—In the dietetic treatment of dilatation of the stomach due to mechanical obstruction, the diet must vary in accordance with the cause of the pyloric stenosis and the condi-

tion of the patient. Anything that obstructs the exit of chyme from the stomach generally causes diminished peptic digestion, and in consequence nourishment should be administered in that form which is capable of

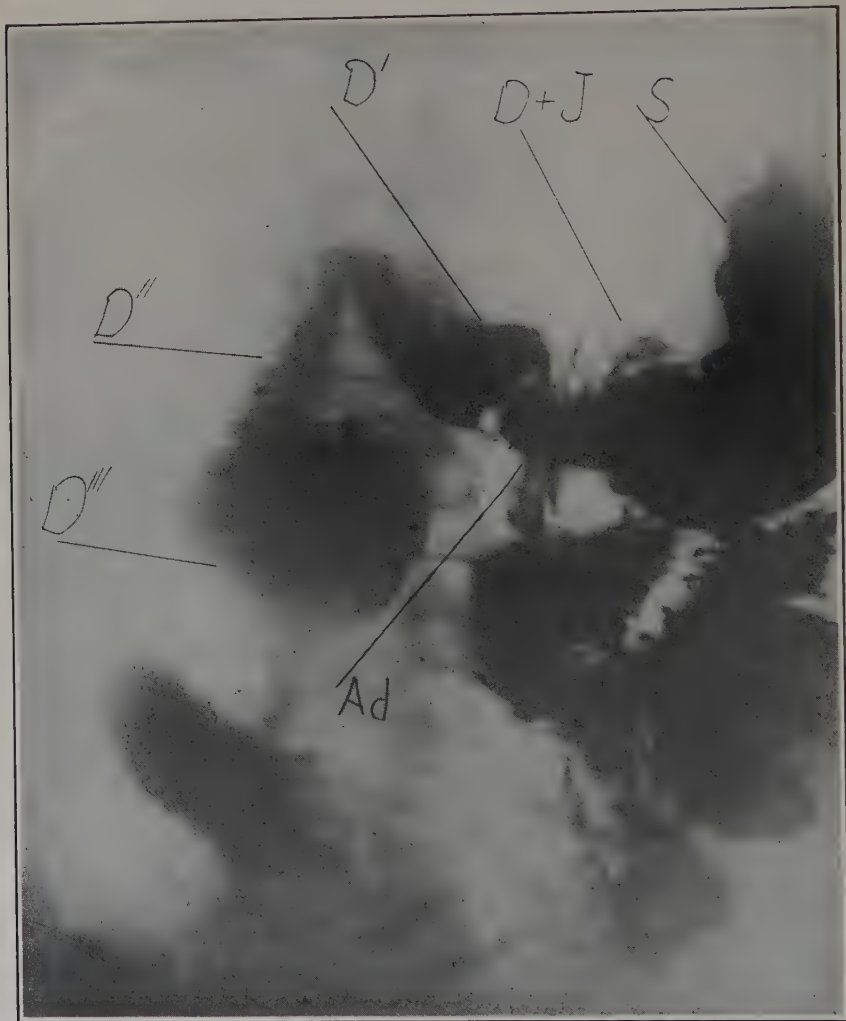


FIG. 3.—RETENTION IN THE STOMACH AND DUODENUM, AS A RESULT OF ADHESIONS OF THE DUODENUM IN THE THIRD PORTION, SECONDARY TO PANCREATIC INFLAMMATION. IN THIS CASE THERE WAS EVIDENCE OF INTESTINAL TOXEMIA, MANIFESTED BY NUMEROUS SKIN LESIONS AND JOINT ANKYLOSIS.

passing most easily into the duodenum. Milk in almost any form, and perhaps particularly when mixed with a suitable proportion of lime water, usually agrees. All food should be well masticated and slowly

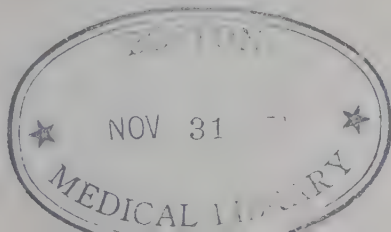
eaten, and should consist of fish finely minced, chicken, game, sweet-breads or hashed mutton, white eggs, and potato, cauliflower or asparagus in small quantities may be given in suitable cases. Scraped raw beef often answers the purpose excellently, and Fenwick recommends curdled milk when the secretion of hydrochloric acid is deficient. In such cases the increasing tendency to stagnate quickly of the food eaten renders a solid diet inadmissible. As a result the meals must be composed of fluids and semi-solids which are most easily digested. Under this head come the various meat jellies, essences and juices. On the other hand, in the treatment of benign stenosis, milk, raw eggs and cream should

DIETARY FOR DILATATION OF THE STOMACH

8 A.M.	Cocoa made with milk, 5 oz., or milk and plasmon; 1 or 2 eggs, or fish cake, 1 oz.; thin toast, $1\frac{1}{2}$ oz.; butter $\frac{1}{3}$ oz.	534 calories	
10.30 A.M.	Milk 5 oz.; rusk; raw-meat sandwich, $\frac{1}{2}$ oz. of meat.....	497	"
1 P.M.	Milk 5 oz.; fish cake or fish soufflé, 2 oz. or oysters; chicken panada, 2 oz.; potato purée, 1 oz.; blancmange, 2 oz. or custard; toast $1\frac{1}{2}$ oz.; butter, $\frac{1}{3}$ oz.....	659	"
4.30 P.M.	Same as 10.30 A.M.....	497	"
7.30 P.M.	Milk soup or milk, 5 oz.; sweetbread, 2 oz. or minced mutton; blancmange and cream, 2 oz. or grape nuts; toast, $1\frac{1}{2}$ oz.; butter, $\frac{1}{3}$ oz.; water, 6 oz.....	487	"
10 P.M.	Arrowroot with or without cream, 6 oz.....	80	"
TOTAL CALORIES.....		2,754	

DIETARY FOR DILATATION OF THE STOMACH (Wegele)

		Protein	Fat	Carbo- hydrates	Alcohol
<i>Morning:</i>	100 gm. scraped ham.....	25.0	8.0		
	Tea with 50 gm. cream.....	1.8	13.3	1.8	
<i>Forenoon:</i>	2 eggs.....	12.0	10.0		
	20 gm. sugar.....			16.0	
	20 " cognac.....				13.8
<i>Noon:</i>	100 " scraped beef.....	20.7	1.5		
	100 " mashed potatoes.....	3.8	0.5	21.3	
<i>Afternoon:</i>	Tea with 50 gm. cream.....	1.8	13.3	1.8	
<i>Evening:</i>	100 gm. roast chicken (hashed) ..	20.7	1.5		
	100 " flour (puff paste).....	4.2	4.3	22.0	
<i>During the day:</i>	80 " zwieback.....	8.5	1.2	55.0	
<i>Night:</i>	200 " milk.....	6.4	7.2	9.6	
Total.....		104.2	60.8	127.5	13.8
Calories.....		427.0	565.0	722.0	100
ENTIRE NUMBER OF CALORIES.....					1,600



form the staple diet. In the majority of cases, tea disagrees, but unsweetened cocoa is digested without trouble. Our experience is that a little good brandy or whiskey given in hot water when food is taken frequently relieves flatulence and other disagreeable symptoms. The point cannot be overemphasized that a liquid and soft diet is best when pyloric stenosis is present, and even benign cases are always surgical and will eventually relapse unless operated upon.

DIETARY FOR DILATATION OF THE STOMACH (Biedert)

	Protein	Fat	Carbo- hydrates
6 A.M. 500 gm. milk, 40 gm. toast.....	20.3	18.4	55.8
8 A.M. Oatmeal soup with 15 gm. of meat solution.....	5.5	1.0	14.2
10 A.M. Cream mixture (125 c.c. of cream and 6 gm. of lactose), 40 gm. toast.....	7.8	12.9	41.5
12 M. Barley soup with yolk of 1 egg.....	4.0	9.2	7.7
140 gm. of roast beef, venison, poultry, boiled chopped beef, or fish.....	48.8	10.4	
40 gm. toast.....	3.3	0.4	30.8
25 " cinnamon cake, soda cake, coffee cake, biscuit, small cup black coffee.....	2.0	1.5	14.0
4 P.M. 250 c.c. of milk, water, or cocoa, 3 zwieback (30 gm.).....	9.2	11.3	38.3
7 P.M. Leguminose soup with 15 gm. of meat solution or soup made from ½ timpe soup lozenge.....	7.6	1.0	12.6
Rice flour mush.....	18.3	14.1	98.1
Total.....	120.8	80.2	313.0
Calories.....	492	748	1,285
TOTAL VALUE ABOUT.....			2,524 calories

DIETARY FOR DILATATION OF THE STOMACH (Biedert)

	Protein	Fat	Carbo- hydrates
6 A.M. 250 c.c. milk, 30 gm. toast.....	11.0	9.3	35.6
8 A.M. 2 eggs, 20 gm. of toast.....	13.7	10.2	15.4
10 A.M. 125 c.c. cream, 2 zwieback.....	6.9	14.0	18.8
12 M. 140 gm. roast beef, venison, poultry, chopped beef, or fish.....	42.8	10.4	
40 gm. toast.....	3.3	0.4	30.8
25 soda, cake, cinnamon cake, coffee cake, biscuit.....	2.0	1.5	14.0
4 P.M. 250 c.c. milk cocoa, 3 zwieback with fruit jelly...	13.5	15.8	44.6
7 P.M. Rice mush, 2 zwieback cakes.....	14.8	10.8	78.7
10 P.M. 250 c.c. milk, 2 zwieback.....	10.9	10.5	26.3
Total.....	118.9	82.9	264.2
Calories.....	486	770	1,083
TOTAL VALUE OF CALORIES.....			2,341

DIETARY FOR DILATATION OF THE STOMACH (Friedenwald and Ruhräh)

<i>Breakfast—8 A.M.</i>			
	Serving	Grams	Calories
Milk with tea.....	1 small cup	100	67
Stale wheat bread.....	2 slices	50	130
Butter.....	1 square	10	80
Egg.....	1	50	80
<i>Lunch—10 A.M.</i>			
Raw scraped beef.....	2 heaping tablespoons	100	118
Toast.....	2 slices	50	130
Butter.....	1 square	10	80
Sherry wine.....	2 ounces	60 c.c.	60
<i>Dinner—12 M.</i>			
Broiled steak.....	1 slice	150	315
Baked potatoes.....	1 medium	100	127
Spinach.....	2 heaping tablespoons	100	166
Asparagus.....		100	185
Mashed peas.....		100	318
Carrots.....		100	41
<i>Tea—4 P.M.</i>			
Cream.....	3½ ounces	100	214
Stale bread.....	2 slices	150	130
Butter.....	1 square	10	80
<i>Supper—7 P.M.</i>			
Rock fish.....	liberal helping	100	80
Stale wheat bread.....	2 slices	50	130
Butter.....	1 square	10	80
TOTAL CALORIES FOR DAY.....			2,067

DYSPEPSIA

Under the term dyspepsia is included a wide range of digestive disorders. In fact, all forms of stomach diseases and complaints are characterized by dyspeptic symptoms. In a consideration of dyspeptics and their treatment by diet there must necessarily be a certain amount of repetition and overlapping. In health, the functions of digestion are carried on without pain or inconvenience. A healthy person is not aware of the work done by his stomach and intestines. Appetite should be keen, and the ingestion of food should be a source of pleasure. But unfortunately the ingestion of food is followed often by a feeling of weight, oppression, distention, flatulence, palpitation, or various other unpleasant sensations, which are generally included under the term dyspepsia.

A good deal of dyspepsia is due to lack of proper mastication. Sir

Lauder Brunton(7) gives some useful hints with regard to the preservation of the teeth. Many people are under the impression that if they brush their teeth thoroughly, they will save them from decay. Brunton draws attention to the fact that such is not the case, because a tooth brush does not penetrate between the teeth, and it is between the teeth that particles of food stick, especially particles of meat. There they afford a lodgment to microbes and generate acid. It is between the teeth that caries usually begins. This lodgment can only be removed by the use of a toothpick. Thus the American habit of using *toothpicks* after meals, although frequently stigmatized by Europeans as a breach of good manners, is really based upon sound principles of hygiene. The movements of the lips act as a brush to the external surface of the teeth, and the tongue does the same for the internal during the day, but during sleep their movements cease and time is afforded for the decomposition of food. A tooth brush should therefore be used before going to bed, and if milk is drunk either by adults or children at bedtime, the mouth should be well rinsed afterwards. Neither the lips, tongue nor a tooth brush can always thoroughly remove the food between the teeth, and a toothpick should be used.

The emotions exert a very considerable influence upon the digestive process.¹ Depressing emotions interfere with the digestion. Although their effect upon the secretion by the stomach or intestine has never been demonstrated, they are known to have a very marked effect upon the secretion of saliva. Fatigue likewise interferes with digestion. Worry has an injurious effect upon digestion.

Chronic Acid Dyspepsia.—Chronic acid dyspepsia, known as *hyperchlorhydria*, may be a secretory neurosis, a reflex, or acquired by errors of diet and hygiene or dependent on organic lesions. In long-standing cases, secondary glandular proliferation may occur. Sometimes a secondary slight gastric dilatation ensues. The characteristic symptom is a burning or gnawing pain in the epigastrium, which begins one or two hours after a meal, or sometimes even later, so that it is described by the patient as "preceding" a meal. It seldom occurs at night. Flatulence, substernal heartburn and acid eructations are common and very annoying. The conditions which belong to this category are mostly found in young women. They are often conjoined with symptoms of chlorosis, general nervousness, etc. Certain errors in diet may also excite hyperchlorhydria, such as hot or highly spiced food, and particularly too strong coffee. Dyspeptic conditions with hyperchlorhydria are frequently observed in excessive smokers and drinkers.

¹ Volume II, Chapter IV, "Hygiene of Eating."

Although the diagnosis of hyperchlorhydria may be suggested, it can only be definitely established by means of the stomach tube. If the stomach is aspirated in a fasting condition, it is empty or almost empty. The acid index after a test breakfast is very high, 70 to 100 or over. Kemp says that one hour after Ewald's test breakfast or three or four after the Leube-Riegel test dinner, the stomach contents show an extremely acid reaction, often two or three times higher than normal, from 100 to 150. Also according to Kemp, it is not sufficient to determine the total acidity, but the value of the free hydrochloric acid is the important feature. Only in hyperchlorhydria is it increased, and in this condition the free H Cl causes the high degree of acidity. Töpfer's test shows that the free hydrochloric acid constitutes the chief content, and is often within 10 to 15 of the total acidity. Some patients, however, with only a total acidity of 65 to 75—mostly H Cl—give active symptoms of hyperacidity.

This perversion of secretion, this rise of acidity, must obviously curtail the normal allowance of time during which starch digestion can continue in the stomach. It ceases when the hydrochloric acid amounts to 0.12 per cent. On the other hand, protein digestion usually proceeds in the ordinary way. Hawkins does not think that the pancreatic digestion of fat is delayed, though theoretically one might suppose that such would be the result. A dislike for fat is occasionally observed. Although, generally speaking, the stomach is emptied at the normal rate, in severe cases there is delay, due probably to pyloric spasm. A certain degree of dilatation sometimes results. Hyperacidity if long continued may bring about chronic gastritis. (*See* Volume III, Chapter XXVIII, for dietary.)

However, the above only presents the condition in its simplest form. Associated conditions of various kinds often complicate the situation; hyperacidity is accompanied sometimes by a gastric hyperesthesia, a primary sensory neurosis or a secondary result of obstinate hyperacidity. Gastropotosis and a floating right kidney in women are not infrequently associated with hyperacidity. In differentiating between the hyperacidity associated with gastric ulcer and pure hyperacidity, it should be noted that when gastric ulcer is present, the characteristic symptoms described above are absent. In hyperacidity pure and simple, easily digested foods are as likely to cause pain as an indigestible diet, and it makes little difference whether the meal be large or small. The distinctions between duodenal ulcer and hyperacidity are much less marked. The coexistence of the two conditions must always be regarded as a possibility.

Among the many causes to which hyperacidity is attributed—for example, imperfect mastication, too rapid eating, abuse of alcohol, over-

eating and so on—the chief place is assigned by some, to a long-continued excess of protein food. Hyperacidity is certainly not observed so often in institutions in which a plain fare is the rule. But it is generally somewhat difficult to charge errors of diet as a cause of hyperacidity, considerably more difficult than in cases of dilatation and chronic gastritis.

As a rule, the general health is good, although in a large number of cases nervous defects play an important rôle. Hawkins states that it is more common in men than women, while Strümpell says that it is most frequent in young women. We should be inclined to think that Hawkins is correct.

DIET IN HYPERACIDITY.—As to the dietetic treatment of hyperacidity, Fenwick, discussing this subject in the "Index of Treatment," points out that the chemistry of digestion in hyperacidity demonstrates in an unmistakable manner that while nitrogenous foods are rapidly dissolved and passed into the intestine, starches and fats lie stagnant in the stomach and undergo fermentation. Pavlov has shown by experiments that different forms of protein food arouse various degrees of activity, beef and mutton being the most potent in this direction, while milk not only induces less secretion, but also fixes the greatest proportion of free hydrochloric acid. Clinical experience also teaches that starchy substances give rise to more discomfort than proteins, and milk to less discomfort than meat. Consequently, in every acute case of the disorder, milk should constitute the staple diet.

It is the general opinion that in severe cases of hyperacidity of long standing, when pain is almost constant and weight is being lost, complete rest for two weeks in bed is indicated. Hawkins, in Sutherland's "System of Diet and Dietetics," advises that during the first week there should be semi-starvation, milk to the value of 560 and later of 800 calories being given with a large dose of Carlsbad salts in hot water every morning on an empty stomach. During the second week of complete rest, the diet may be gradually extended. If, as is usual, the gastric mucosa has now lost its extreme sensitiveness, one or two eggs, lightly boiled, poached or even buttered may be tried, and later the addition of four ounces of milk pudding or rusks in milk may be made, so that at the end of the second week the patient is receiving sufficient food to supply nearly 1,500 calories. During the third week, he may be allowed out of bed, to drive and take short walks, and to get ready for his usual avocations. During this period the meals may be arranged on the following plan, which Hawkins outlines in Sutherland's "System of Diet and Dietetics":

A SUITABLE DIETARY FOR HYPERCHLORHYDRIA

8.30 A.M.	Milk diluted, 8 oz.; 1 or 2 eggs cooked in any way; toast or rusks, 1 oz.; butter, $\frac{1}{2}$ oz.....	502	calories
11 A.M.	Milk as before.....	157	"
1 P.M.	Milk as before; fish (sole, plaice, or whiting) or chicken, 4 oz.; custard or jelly or blancmange with cream, or savory omelette, 4 oz.	667	"
4.30 P.M.	Milk as before.....	157	"
7 P.M.	Milk as before; 1 or 2 eggs cooked in any way; toast or rusk or butter as before.....	502	"
10 P.M.	Milk as before; rusk.....	224	"
TOTAL CALORIES FOR DAY.....		2,209	

In a general way, in the dietetic treatment of hyperacidity, all condiments and spices, mustard, pepper, vinegar, horseradish, ginger, curry, etc., must be forbidden, as well as salads and all vegetables containing much cellulose. No article of food should contain hard material, such as pips and seeds. Coffee should be excluded, cocoa or tea freshly made, with half milk, being allowed. At first no alcohol in any form may be taken, but as time goes on without the recurrence of symptoms, its use may be safely resumed with certain limitations. All starch, if it be used at all, should be dextrinized by dry heat, as in thin toast and rusks, or thoroughly gelatinized by moist heat, as in milk puddings. Pastry must be avoided. Fresh uncooked butter and cream may be taken freely and perhaps are useful in somewhat lessening the secretion of gastric juice. Sugar may be freely used, preferably in form of dextrose or honey. Jellies are useful, gelatin fixing a good deal of hydrochloric acid in its digestion; they may be flavored with lemon, orange or fruit juice if necessary, but fruit itself must be avoided. Milk, eggs and grated cheese are always correct articles of diet. Junket flavored with cocoa can be taken. Soup may well be avoided, in view of its stimulant effect and its small nutritive value. Fluid may be given freely at meals if there is no dilatation, and either milk and soda water or any mineral water should form the staple drink. Hawkins lays further emphasis on the fact that the temperature of the food should be considered and extremes avoided by preserving a minimum of 55° F. and a maximum of 130° F. A temperature of 100° F. may serve to minimize the stimulus to the secretion of acid. Avoid tobacco.

The Use of Common Salt.—Experiments by Hemmeter, referred to by J. Herbert Hawkins in Sutherland's 'System of Diet and Dietetics,' have shown that the acidity of the gastric juice is materially reduced in

dogs fed on meat, from which the salts have been largely extracted by boiling with distilled water. Moreover, Cahn by further experiments so reduced the chloride content of the blood that the stomach secreted a neutral inactive fluid. This fluid if acidified at once became active and digested fibrin, so that it may be concluded that the secretion of pepsin is independent of that of acid. Hawkins, considering the situation from all angles, is of the opinion that it is wise to eliminate salt from the diet in this condition, but admits that he has witnessed no immediate beneficial results in patients who have so excluded it.

The following is a mixed diet advocated by Hawkins as a curative line of treatment.

DIET FOR HYPERACIDITY

Half an hour before breakfast:

Hot water, 8 oz.; with a small dose of Carlsbad salt.

8.30 A.M.	Cocoa made with milk, 10 oz. (or freshly made tea with half milk); Graham or wholemeal bread, toasted, 2 oz.; butter, $\frac{2}{3}$ oz.; honey, $\frac{1}{2}$ oz.; 1 or 2 eggs, cooked in any way..	780 calories	
11 A.M.	Milk, diluted (6 to 1) with soda water, 6 oz.	107	"
1 P.M.	Meat (preferably veal, mutton or ham), 2 oz. (or fish, chicken, game, sweetbread or savory omelette); milk pudding, 2 oz. (or custard); toast, 1 oz.; butter, $\frac{1}{2}$ oz.; cheese, $\frac{1}{2}$ oz.; milk, diluted, 6 oz. (or water, plain or aërated).....	536	"
5 P.M.	Milk, diluted, 6 oz.; toast, 1 oz. (or rusk).....	222	"
7.30 P.M.	Milk soup, flavored with celery, turnip or onion, 6 oz.; fish, or meat as at lunch; potato purée, 1 oz. (or lentils); milk pudding, 2 oz. (or blanchmange, jelly custard); toast, butter, cheese as at lunch (or cheese straws); milk, diluted, 6 oz. (or water, plain or aërated).....	620	"
Bed time:	Milk, diluted as at 11 A.M.	107	"
TOTAL CALORIES FOR DAY.....		2,372	"

Opinions differ on a yet more important point, which is the relative advantage of an amylaceous and a protein diet. While Fenwick appears to favor a protein diet, Hawkins takes the ground, arguing from the effects of protein and carbohydrate foods, that protein relieves the symptoms but perpetuates the malady, whereas the effect of an amylaceous diet is curative. Therefore he is disposed to advocate a middle course. He thinks that a protein diet, dealing as it does with symptoms alone, is the most suitable for and should be confined to the patient whose chance of improvement is small so long as his livelihood depends on the continuance of an unhealthy and hurried existence. Such a person is generally a clerk, who is so placed in his work that no attempt at a complete cure can be made.

Some starch, however, should be allowed, even in these cases. He may also use as a palliative, milk, meat lozenge, bicarbonate of soda, or bismuth lozenge, when the pain comes on at his work. Chewing gum with resulting flow of saliva and consequent neutralization of some acid in the stomach is also permissible with the same object in view.

As an example of a diet based on the use of protein for hyperacidity, that of Wegele may be quoted:

DIETARY FOR HYPERACIDITY (Wegele)

		Protein	Fat	Carbo- hydrate	Alcohol	Calories
<i>Morning:</i>	100 gm. tea with milk	3.4	3.6	4.8		85
	2 soft-boiled eggs	12.0	10.0			160
<i>Forenoon:</i>	100 gm. raw ham	25.0	8.0			275
	50 cream	2.0	13.5	1.7		135
	200 gm. Aleuronat meal broth (10 gm. Aleuronat to 200 broth) or 250 gm. oatmeal broth (20 gm. oatmeal to 250 broth) . . .	10.2	1.7	8.0		60
<i>Noon:</i>	150 gm. beefsteak	58.0	1.7	8.0		275
	200 " mashed potatoes . .	6.2	3.0			225
	200 " white wine with Saratoga, Vichy or Bili- ner water			3.5	16.0	200
<i>Afternoon:</i>	100 gm. tea	3.4	3.6	4.8	}	450
	150 " cream	2.0	13.5	1.7		
<i>Evening:</i>	50 " cold meat	60.2	4.0			100
	2 scrambled eggs, 100 gm. wine		3.5		8.0	100
<i>At meal times:</i>	100 gm. Aleuronat toast . .	28.3	1.5	66.7		85
<i>Evening, 10 P.M.</i>	250 gm. milk	8.5	9.0	12.0		157
Total		229.2	85.1	149.4	16.0	2,442
Calories		940.0	790.0	600.0	112.0	
ENTIRE NUMBER OF CALORIES		2,442				

Until a cure has been effected, the diet should be simple. No alcohol whatever should be allowed until the cure is complete and then only in the strictest moderation if at all.

The main reliance in the dietetic treatment of hyperchlorhydria is in the selection of such articles of food as combine most readily with the excess of acid. Protein foods meet this requirement; therefore, milk, eggs and meat should compose a large bulk of the dietary. Some authorities contend that the excessive use of protein is largely responsible for the

DIETARY FOR GASTRIC HYPERACIDITY (Biedert)

		Grams Protein	Grams Fat	Grams Carbo- hydrates	Calories
7 or 8 A.M.	500 c.c. of milk, 40 gm. toast.....	20.3	18.4	55.8	483
10 A.M.	70 gm. of broiled veal (or 100 gm. of stewed veal without the skin, pre- pared as white ragout) or beefsteak or fowl, 30 gm. of toast, 1 egg, 2 zwieback (20 gm.), $\frac{1}{8}$ of a liter of wine.....	32.3	12.0	36.9	395
12 M.	French soup, with yolk of egg.....	4.0	9.2	7.7	134
	140 gm. of broiled or boiled fowl, roast meat or goulash or hash, 200 gm. of raw meat as beefsteak, or 100 gm. of finely chopped boiled beef or fish...	42.8	10.4		272
	Asparagus with cream gravy (a few heads of asparagus and half a spoon- ful of gravy) 20 gm. on toast.....	2.2	1.2	16.4	87
	Omelet soufflé.....	12.1	18.3	9.6	259
	One small cup of black coffee.....				
4 P.M.	250 gm. of milk cocoa, 3 zwieback....	13.5	15.8	44.6	385
7 P.M.	70 gm. of cold meat with 100 gm. of meat-jelly, 20 gm. of toast.....	24.2	5.4	15.4	212
	20 gm. of Swiss or Dutch cheese.....	5.4	6.1	0.5	81
	Total.....	156.8	96.8	136.9	2,308

disease. As a consequence, it is inadvisable to continue the dietary, which, while relieving the symptoms, perpetuates the disease. The supporters of this view recommend a diet less rich in protein, one containing farinaceous foods suitably combined with protein. It can be readily seen that the objection is more theoretical than practical, and from long practical experience, the authors unhesitatingly advocate a diet relatively rich in protein, as preëminently the diet for this disease. Large doses of alkalies, *e.g.*, bicarbonate of soda or carbonate of magnesia given in 30 to 40 grain doses, two hours after food, tend to neutralize the hyperacidity of the gastric secretion. A glass of Vichy water will act in the same way and is a valuable adjunct to the treatment. Milk is helpful by virtue of its being an efficient acid neutralizer. It is best given with the addition of lime water in proportion of three of the former to one of the latter, or it may be diluted one-half with Vichy. Foods rich in carbohydrates should be taken sparingly, because free acid appears in the stomach soon after their

ingestion, which interferes with the normal digestion of starch under the influence of saliva. (*See also* dietary, Volume III, Chapter XXVIII.)

The dietaries on page 62 are recommended by Chalmers Watson(8), in his excellent work on "Foods and Feeding," as the most appropriate for the treatment of this disorder. Number I is a diet rich in protein and is the one to be recommended; Number II may be termed a milk and carbohydrate diet in which the farinaceous foods are combined with proteins, and it has advantages in certain cases where the previous history of the patient indicates he has indulged freely in animal foods.

Simplicity, it will be noted, is aimed at in both of these dietaries. Stimulating articles of diet such as tea, coffee, alcohol, mustard, pepper and vinegar are restricted in amount. Soups are not allowed on account of their bulk. After the second week, this dietary may be extended by the gradual addition of eggs and malted farinaceous foods. Milk will form the staple of the alimentation.

Hypersecretion.—Hypersecretion, or *gastro-succorhea*(9), is a perversion of function in which the glands of the stomach secrete quantities of gastric juice even when the stomach is empty, and hence when there is no irritation from ingested food. Continuous hypersecretion is a form of secretory neurosis, and in our opinion occurs only in a late stage in cases of long-continued hyperacidity which have been imperfectly treated. The pain is very apt to occur at night; vomiting and consequent emaciation are more marked than in simple hyperacidity; and lastly, some degree of dilatation of the stomach is usually present. The diagnosis rests on the removal from the stomach of a considerable quantity of gastric juice, and in well-marked cases the stomach yields 4-8 ounces of clear, yellowish-green fluid with a specific gravity of about 1.005 and a total acidity between 60 and 80. Hypersecretion may be divided into two classes, paroxymal or intermittent hypersecretion and chronic hypersecretion.

Kemp does not agree with the view that hypersecretion is a purely secretory neurosis, though unquestionably nervous conditions, such as mental excitement or mental overexertion, may be the direct cause in some cases. He states that while hypersecretion is rarely a neurosis, vagotonia may be a factor in its causation. An organic affection such as ulcer may be a factor.

Direct irritation of the mucous membrane can be the cause, in form of the same factors that produce hyperchlorhydria, such as rapid eating, indigestible food, spices and condiments, abuse of alcohol, excessively hot or cold food or drink, etc.

NUMBER I

RICH PROTEIN DIET

	Calories
<i>Breakfast</i> —8 A.M.	
A cup of milk flavored with tea.	
2 soft-boiled eggs or a portion of steamed fish, or a slice of cold tongue or two slices of broiled bacon.....	160
1 slice of toast with butter.....	250
<i>Forenoon Lunch</i> —11 A.M.	
$\frac{1}{2}$ pint of milk.....	170
<i>Dinner</i> —1 P.M.	
Steak or mutton chop (grilled) or roast chicken.....	75
Cauliflower or stewed onions.	
1 slice of toast and butter.....	250
<i>Afternoon Lunch</i> —4.30 P.M.	
Tea made with milk and a little cream.....	125
<i>Supper</i> —7 P.M.	
Steamed fish.....	100
Breast of chicken.....	80
Meat and cheese savory.	
Glass of milk.....	170
1 slice of toast with butter.....	250
9.30 P.M.	
A glass of milk.....	170

NUMBER II

MILK AND CARBOHYDRATE DIET

	Calories
<i>Breakfast</i> —8 A.M.	
A cup of coffee or cocoa with plenty of milk.....	200
Bread, toast, roll or rusk.....	150
Butter and honey, jam or marmalade.....	300
<i>Forenoon Lunch</i> —11 A.M.	
Cup of milk with one egg beaten into it.....	250
<i>Dinner</i> —1 P.M.	
Meat, fish, chicken, game or sweetbread.....	150
Milk pudding or stewed fruit jelly.....	125
Biscuit, butter and cheese.....	225
<i>Afternoon Lunch</i> —4.30 P.M.	
One rusk or biscuit.....	100
A cup of milk flavored with tea.....	225
<i>Supper</i> —7 P.M.	
A bowl of clear consommé.	
A portion of fish or meat.....	75
1 large baked potato.	
1 large portion of egg custard.	
Biscuit with butter and cheese.	
1 glass of milk.....	170
9.30 P.M.	
$\frac{1}{2}$ pint of milk diluted with an equal quantity of Vichy.	

Bickel's diet list presents the food which slightly and the food which strongly excite gastric secretion (Friedenwald and Ruhräh):

Foods slightly exciting acid secretion:

Liquids: Water, alkaline water tea, cocoa (rich in fats), milk (rich in fats), cream, and egg-albumin.

Condiments: 0.9 per cent. of salt solution.

Solids: Cooked meats, fats of all kinds, cooked vegetables, such as potatoes, asparagus, cauliflower, spinach, white beets (all in purée), starch, sugar.

Foods strongly exciting acid secretion:

Liquids: All alcoholic and carbonated drinks, coffee, cocoa (poor in fats), skimmed milk, beef-tea, beef extract, strongly seasoned soups, yolks of eggs, hard-boiled eggs, beef solution.

Condiments: Pepper, cinnamon, mustard, cloves, paprika, salt in concentration.

Solids: Raw or slightly cooked beef, dark meats, salted meats (pork, pickled meats, smoked fish), dark breads.

DIET IN CHRONIC HYPERSECRETION.—The dietetic treatment of chronic hypersecretion is practically the same as that of hyperacidity, and the question arises again as to the relative advantages of an amylaceous and a protein diet. Fenwick, as in the case of hyperacidity, warns against the use of all amylaceous substances that have not previously been digested, excess of fats and cellulose. He is aware, however, that the total exclusion of starch from a dietary usually increases the tendency to emaciation and favors constipation, so that it becomes necessary to devise a method by which a moderate amount of carbohydrates may be given each day. Because the presence of gastric juice in the organ at once inhibits ptyalin digestion and favors the fermentation of sugar, he suggests that the viscus should be emptied of its acid contents before starch is given and that a suitable amount of diastase should be added to the meal to aid the conversion of at least a portion of the starches into sugar before the accumulation of hydrochloric acid puts a stop to the process. Thus it is well to wash out the stomach each morning with a weak alkaline fluid, and immediately afterward to give a meal consisting of oatmeal, a cereal soup, bread and milk, milk pudding, or some special form of starchy food that has been partially predigested.

Bread should not be eaten, as it is almost certain to increase the distention and flatulence. Thin toast, rusks and starch-free biscuits are the most useful substitutes. Green vegetables should not be eaten, but sea-kale, asparagus or stewed celery may be taken in moderation. All varieties of fruit are apt to increase the gastric acidity; apples baked or stewed without sugar and oranges are the least harmful. Butter and cream in moderate amounts are beneficial, but excess should be avoided, as fat vom-

iting may be produced thereby in the later stages. Alcohol almost invariably disagrees, and tea always; but cocoa made from the nibs or husks and diluted with milk or plasmon and peptonized cocoas, can usually be taken with benefit.

Milk is invaluable because it rapidly fixes free hydrochloric acid and is a comparatively slight stimulant to secretion. When raw milk disagrees, there is no doubt but that the stomach contains large quantities of stagnant acid and the organ must be cleared by lavage for several days before milk can be tolerated. According to Fenwick, as a rule, from six to ten ounces of milk, either raw or mixed with lime water, may be administered every two hours. In other cases, it may be necessary to employ fresh whey or Horlick's malted milk. He does not think that curdled milk is indicated where the secretion of the stomach is very acid. Sour milk should only be used in cases of "appendicular" hypersecretion accompanied by gastric sub-acidity, where success is sometimes obtained. Animal food may be allowed in the presence of gastric ulcer, when it should be minced fine and carefully masticated.

We are of the opinion that if the appetite and physical condition are good, it is just as well to give but three meals a day so as to rest the stomach and not tend to keep up gastric secretion. In this event, the excessive acidity can be neutralized by alkalies between feedings.

On the other hand, as in hyperchlorhydria, some patients while readily feeling satiated, desire food at frequent intervals. Also, they may be losing weight, especially in the cases complicated by dilatation; in such cases small meals, in soluble form or mushes, which are readily expelled from the stomach, must be given. As the nutrition must be kept up, frequent feeding is necessary. For example, the diet when given in small, frequent meals would be the same as in hyperchlorhydria, but in less fluid form.

SUITABLE DIETARY FOR GASTRIC HYPERSECRETION

	Calories
7.30 A.M. Milk or cocoa, 8 oz.; 2 zwieback or toast, and 1 egg.....	380
10 A.M. Beef sandwich or ham sandwich.....	257
1.30 P.M. Soup, 8 oz., with raw egg, steak (100 gms.), potatoes (50 gms.)...	456
4 P.M. Same as at 10 A.M.....	257
7.00 P.M. 2 eggs or meat (100 gms.), 2 slices of toast, butter (20 gms.).....	450
TOTAL CALORIES FOR DAY.....	1,800

If there is dilatation, more soluble food should be given.

While the dietetic treatment of hypersecretion should be in all respects practically the same as in hyperacidity, it must be borne in mind

that hypersecretion is a more severe condition and consequently less amenable to treatment. We must therefore emphasize the importance of commencing the treatment with semi-starvation and of minimizing gastric stimulation. Further, the slight rest cure recommended as the first step in the treatment of hyperacidity should be extended. In all essential features the treatment of continuous hypersecretion is the same as in hyperacidity.

Paroxysmal Hypersecretion.—Hawkins, in discussing the gastric neurosis, defines paroxysmal or intermittent hypersecretion, in its pure form, as clearly a neurosis independent of any change in the stomach, in fact a manifestation of some disturbance arising elsewhere, which produces its end effect through the vagus. In some cases the distinction cannot be made between it and migraine. Also it resembles the gastric crisis of tabes, while a single attack might be mistaken for the result of some indigestible food or an irritant poison.

Paroxysmal hypersecretion usually attacks the young, and it is said to be precipitated by emotion. Although it can be traced to dietetic errors, and smoking may be the immediate cause of an attack, its occurrence is capricious and inexplicable. It is superfluous to enter into a minute description of the symptoms. In the pure form of paroxysmal hypersecretion with intervals of good health, little can be done.

DIET IN PAROXYSMAL HYPERSECRETION.—The diet should be supervised in those subject to such attacks, and simplified, if necessary. Hawkins' experience is that without any reason to advance in favor of such a view, it is well to diminish the meat taken by patients suffering from the condition, allowing it only at one meal in the day, preferably at the mid-day meal. Tobacco and alcohol should be forbidden.

Mechanical Dyspepsia.—When food is imperfectly masticated, due to bad teeth or to the habit of bolting a meal, or when tough or indigestible articles are swallowed, acute irritation of the gastric mucous membrane does not necessarily follow. However, if they are so imperfectly prepared, or broken up, that they cannot be dissolved or adequately acted upon by the gastric juice, they cannot pass through the pyloric orifice of the stomach. Consequently, acute spasm of the pylorus is set up, and the resulting exaggerated peristalsis often produces severe colicky pains. As a rule, the offending cause can be removed by an emetic, preferably by lavage, or by a dose of castor oil, when the symptoms will rapidly subside. Kemp describes this condition under *Acute Atony*.

DIET IN MECHANICAL DYSPEPSIA.—The dietetic treatment must depend upon the amount of pain and irritation. Temporary abstinence

from food is the course indicated. As Habershon, in a paper contributed to the "Practitioner," in April, 1906, points out, no definite rule of diet for such cases can be laid down, but it is obvious that when food can be taken, liquid food must first be given, as in the case of gastric catarrh. No exact directions are needed. In some cases, an excess of one form of diet is liable to produce a very sudden dyspepsia. Too much potato, bread, tea, alcohol, are frequently responsible for an attack of indigestion.

It may be as well to insert here a diet list not only suitable for the form of dyspepsia mentioned above, but for almost every case of chronic disorder of gastric secretion, whether due to functional or organic disease.

Food should be taken by the dyspeptic at regular intervals; four meals may be taken per diem, and no food or drink may be taken between meals or after meals. The meals should be breakfast, dinner, lunch and supper. At least four hours should elapse between meals, with the single exception that dinner, or supper, may be taken three hours after a light afternoon tea.

Dr. S. H. Habershon(10) recommends the following dietary for chronic dyspeptics:

SUITABLE DIETARY FOR CHRONIC DYSPEPSIAS

Breakfast—8 A.M. to 9 A.M.

Lightly cooked bacon, eggs, if they suit, lightly boiled or poached, omelet, buttered eggs; game, hot or cold; freshly cooked potted meat; stale bread, twenty-four hours old, toast, butter, sparingly; tea—China tea by preference—freshly infused for not longer than five minutes and well diluted, or coffee, with milk; cocoa infused from the nibs.

Dinner—12.30 to 1.30 P.M.

Fish—Any of the white varieties of fish, boiled by preference; if fried the skin must not be eaten; these are whiting, sole, lemon sole, cod, turbot, smelts, halibut, and others. Oysters are easy of digestion. Sauces—only simple melted butter flavored with anchovy; meats—freshly cooked meat, preferably mutton, chicken, game, sweetbread, tripe, calf's foot, etc.

Vegetables—Potatoes, sparingly and grated and rubbed through a sieve, not whole or mashed, cauliflower; the leaves of cabbage, bunch greens; vegetable marrow; seakale; asparagus, cooked celery; Spanish onions, turnip tops, Scotch kale, watercress, mustard and cress, endive, leaf of lettuce. No vinegar or salad dressing; sweets. Any light milk pudding, made from rice, flaked rice, ground rice, sago, semolina, and custard pudding, caramel or sponge cake or cup puddings. Fruit, cooked apples, cheese; very sparingly.

Beverages—Stimulants generally injure digestion, and if possible, the patient is better without wines. The least injurious is Carlogood Moselle, a white wine free from acidity agrees well, or a small quantity of spirit, one or two tablespoonfuls well diluted—no malt liquors, or effervescing waters.

Lunch—3.30 to 5 P.M.

Tea, freshly infused, as at breakfast, and very weak, and not exceeding a pint in quantity. Sometimes when desirable to give milk, the tea may be infused with boiling milk instead of boiling water; bread or toast and butter; sponge or Madeira cake.

Supper—7 to 7.30 but not later than 8 P.M.

Food as at lunch, but the meal may be more substantial; a few tablespoonfuls of clear soup will do no harm, unless flatulence is present; no thick soups should be taken. No raw apples, or pears, grapes or plums. In some cases, a ripe pear, peach, nectarine or grapes will not disagree.

The late Sir Andrew Clark of London, who was an authority on dyspepsia, in his diet lists gave the following advice, "Avoid soups, sauces, pickles, spices, curries, cured meats of all sorts, tinned or otherwise preserved foods, salted, smoked, dried provisions, pie, pastry, cheese, creams, ice, preserves, dried fruits, nuts, salads, alcoholic beverages, unless specially prescribed, strong tea and strong coffee; much fluid of any sort and all sweet, sour or effervescent beverages."

Cerebral and Nervous Dyspepsia.—Cerebral and nervous dyspepsia is occasioned by exhaustion or aberration of the nervous mechanisms of the digestive functions. As gastric secretion depends upon the efficient performance of the reflex nervous mechanism, it can be easily understood that when this mechanism is disordered, the digestive process becomes deranged to a greater or less extent.

Brain exhaustion, better known as brain fag, is very common, more common by far than it should be, and is greatly increasing, owing to the nerve-racking modern city life. Worry and anxiety are fruitful causes of this condition, and no doubt the busy city man, from the exigencies of his calling, and not infrequently from his manner of living, is most prone to be attacked by this form of dyspepsia. Secretion is imperfectly performed. Since the nervous system is at fault, not only does the gastric secretion suffer, but the salivary, the pancreatic and the hepatic secretion share in the deficiency. In the severe form of the disease, when emaciation is rapid, the patient should be kept in bed for a month or six weeks. Milk diet combined with general massage and electricity should be resorted to.

In cases of brain fag, the condition varies, for the diminution of the activity of the secretory organs is not always uniform. Occasionally, the enfeebled hepatic or pancreatic secretion is of greater importance than the gastric. In cases of this nature, care must be taken to diminish the carbohydrate elements of the diet, or to prescribe with them the ferments of pancreatic digestion, or to give food in a semi-digested form.

DIET IN BRAIN FAG.—In the forms of nervous dyspepsia, the symptoms are only slightly influenced by the nature of the food, and this fact renders it inexpedient to prescribe a fixed dietary. As a rule, an excess of non-nutritious liquids, such as beef tea, broths, tea and mineral waters, tends to inflate the stomach and to increase the sense of discomfort, while green vegetables and fruits almost always disagree, and therefore should be prohibited. Too much food should not be eaten at one time, and the meals should be composed of easily digested materials taken at intervals of three hours. If an excessive craving for food occurs between the meals, egg and milk, hard-boiled eggs or a cup of milk or cocoa may be allowed. The quantity of milk given must depend upon the state of the gastric se-

DIETARY FOR NERVOUS DYSPEPSIA (Burkart)

(After the fifteenth day)

		Protein	Fat	Carbo- hydrates
7	A.M.: 500 gm. milk.....	17.0	18.2	24.0
	Small cup of coffee or tea (20 gm. cream).....	0.7	5.0	0.7
	80 gm. cold meat.....	30.8	2.0	...
8	A.M.: Milk toast.....	4.5	0.5	29.0
	20 gm. butter.....	0.3	16.6	0.1
	100 gm. baked potatoes.....	1.8	10.0	25.0
10	A.M.: 300 gm. milk.....	10.2	10.9	14.4
12 M.	300 gm. milk.....	10.2	10.9	14.4
	200 gm. soup.....	2.2	4.0	11.4
	200 gm. beef.....	76.4	5.4	...
1	P.M.: 200 gm. potatoes.....	6.2	1.7	42.6
	125 gm. prunes.....	0.4	...	8.3
	200 gm. of farinaceous food of any kind.....	12.8	21.2	45.0
3.30	P.M.: 500 gm. milk.....	17.0	18.2	24.0
	300 gm. milk.....	10.2	10.9	14.4
5.30	P.M.: 80 gm. cold meat.....	30.8	2.0	...
	Milk toast.....	4.5	0.5	29.0
	20 gm. butter.....	0.3	16.6	0.1
8	P.M.: 80 gm. broiled meat.....	30.8	2.0	...
	40 gm. zwieback.....	0.6	5.2	33.2
	500 gm. milk.....	17.0	18.2	24.0
9.30	P.M.: 500 gm. milk.....	17.0	18.2	24.0
	20 gm. zwieback.....	0.3	2.6	16.6
Total.....		295.0	199.8	380.2
Calories.....		1,209	1,005	1,559
ENTIRE NUMBER OF CALORIES.....				4,616

cretion. In the milder cases, when generally the secretory and motor powers of the stomach are unaffected, five pints of milk each day in divided doses, either with or without lime water, afford an excellent substitute for other forms of nourishment and promote the formation of fat and muscle. On the other hand, in the severe variety of the complaint, the failure of the gastric secretion renders raw milk very liable to disagree, and then it should be given in restricted amounts, either peptonized or well diluted.

Hepatic Dyspepsia.—Hepatic dyspepsia, otherwise known as bilious dyspepsia, occurs generally in people who are constitutionally liable to hepatic disorders. This disposition may be defined as due to a hepatic diathesis. Or as Habershon puts it, there is an inherited tendency to deficient hepatic secretion. Eating too much, and especially ingesting an excess of nitrogenous materials, is the source of this form of dyspepsia, in the majority of cases. If gastric digestion has not sufficiently dealt with the nitrogenous foods, too much is left to the duodenal secretions. The hepatic secretion is supposed to promote the destructive metabolism of the albuminoid constituents of protein matter. When there is a deficiency of bile, the normal peptones and other by-products of digestion are absorbed into the general circulation and produce certain deleterious results.

Fothergill, in his work on "Indigestion and Biliousness," thinks that biliousness is due either to the normal products of gastric digestion acting as poisons, when directly absorbed without the influence of biliary metamorphosis, or in the absence of a sufficient secretion of bile. In this case certain decompositions of nitrogenous products of digestion must occur with the absorption of substances and by-products which virtually act as poisons when they reach the general circulation.

DIET IN HEPATIC DYSPEPSIA.—In cases of this variety care should be taken to restrict the ingestion of nitrogenous food. Nevertheless, a purely carbohydrate diet is not advisable, because such a diet reduces hepatic secretion considerably. Therefore, a moderate amount of meat should be taken, avoiding red or butcher's meat. However, the term excess of food is an essentially relative matter. When hard exercise is taken by a bilious or gouty subject, much more nitrogenous food can be eaten with impunity than when a person of similar diathesis leads a sedentary life.

Duodenal Dyspepsia.—In the case of duodenal dyspepsia, due to gastro-duodenal catarrh, or to hepatic disorder caused by excess of food, the profound influence exerted by the pancreatic secretion cannot be left

out of account. While it is known that solution of proteins is completed by the alkaline pancreatic secretion, it is a matter of extreme difficulty to differentiate the share taken by the peptic and pancreatic ferments. When amylaceous foods are imperfectly digested, and when the symptoms are most marked, about two or three hours after food, it is probably the pancreatic secretion which is at fault. Care must be then taken to diminish the carbohydrate elements of the diet, and to supply in addition certain ferments.

Chronic engorgement and congestion of the gastric and intestinal vessels (the cause of the dyspepsias of chronic alcoholics), hepatic congestion and cirrhosis of the liver, morbus cordis, emphysema, and all pulmonary diseases in which the right side of the heart becomes dilated and the systemic venous circulation embarrassed, are usually associated with an excess secretion of mucus. The collection of mucus on the walls of the stomach is sometimes so great that the effect of the gastric juice and other secretions on the food is imperfect. On account of this lack of adequate digestive processes, food must be easily digestible, and should be given frequently and in small quantities, especially where the gastric distention would hinder the free movement of the diaphragm. (*See dietary, Volume III, Chapter XXVIII.*)

DYSPEPSIA AS A SECONDARY DISEASE

It is evident that in the consideration of so wide a subject as dyspepsia, many cases come under more than one category. Dyspepsia is frequently but one symptom of an organic disease. Moreover, several causes may coöperate in producing aberration of the functions of digestion. In actual practice, a large proportion of the cases must be dealt with on their individual merits. Though a general classification may be made and general rules laid down, it is impossible to place upon paper a method of dietetic treatment suitable for every case.

Fenwick has shown that in every 100 cases of chronic dyspepsia in persons over sixty-five years of age, 66 are secondary to organic diseases of some important organs of the body, while 34 owe their symptoms to a progressive degeneration of the secretory structures of the stomach and intestines. According to Kemp, in about one-third of the cases, no organic change can be located in any particular organ. There is, however, an impairment of the secretory functions of the digestive tract, the general assimilative powers decline, the body assimilates less organic matter, and destroys less inorganic matter with a resulting waste of tissue in many

cases. In others, disturbances of metabolism occur, which result in obesity and in the derangement of the eliminative functions. In such there is frequently associated fatty degeneration of the organs.

Even though there is no marked evidence of general arteriosclerosis, Kemp believes these disturbances of the gastro-intestinal functions in the aged to be, in most cases, a manifestation of visceral arteriosclerosis, varying from a mild to a severe type, with resulting damage to the glands presiding over the functions of digestion. He states that in cases of senile dyspepsia food should be prepared in the most digestible form. It is better to administer four or five small meals daily than three large ones.

DIET IN ASTHENIC CASES.—In the asthenic cases with malnutrition, food of a high caloric value, such as carefully prepared fats and starches, is indicated, while patients of obese type should receive a minimum of these. In such cases frequent small meals best relieve the sensation of hunger. The above rules are only general. In the earlier stages of treatment, peptonized milk may be given for a brief period, with matzoon, kumiss, lactone-buttermilk, bacillac, eggs, barley and rice gruel. Excessive amounts of fluid food, however, tend to produce too much gas in some patients. Small quantities of thicker gruels and soups, such as pea soup, strained bean soup, potato, barley, rice and sago, often agree. Fenwick holds that barley, oatmeal and rice must be given with caution. Kemp points out that much depends on the cooking of the cereal, which must be thorough. The cereal should be passed through a colander so as to ensure removal of the membranous coverings. As the patient improves, meat or fish minced fine should be given in small quantities, such as chicken, game, calves' brains, sweetbread, calves' feet, raw or scraped beef and pigeon.

Fats such as butter and cream must be tried in the asthenic patients suffering from malnutrition. They sometimes agree and at times do not. The diet must be necessarily modified by the conditions found in the functions of the intestine, which should be determined. Red meat should be avoided when there is intestinal putrefaction of a marked character, and the condition should receive treatment. Toast baked and dried in the oven or zwieback are preferable to bread. Crackers are admissible, green vegetables and oranges may be tried. If plain milk disagrees and peptonized milk is unpalatable, a little lime water or citrate of soda may be added to the milk. The blood pressure, if high, should always be reduced.

ULCERS OF THE STOMACH AND DUODENUM

In no form of disease of the stomach is dietetic treatment of greater importance than in the treatment of ulcers of the stomach and duodenum. Successful treatment of such ulcers may be said to largely hinge upon a suitable and properly regulated diet. This statement applies to all stages of the disease. The condition, in the first instance, is due to some extent to errors of diet, overeating, abuse of alcohol, and to irritation of food and drink, generally in the alimentary tract. Chlorotic girls are especially prone to develop the chronic form of gastric or duodenal ulcer from comparatively slight abrasions of the gastric mucous membrane. Patients having malaria are likewise liable to gastric ulcer. Badly fitting corsets or belts which continually press upon the epigastrium, or occupations in which a hard substance is constantly pressed against the abdomen, may prove the exciting cause of ulcer. Kemp doubts these last factors.

Appendical inflammation, infection from gall bladder or from the mouth, or elective localization of streptococci (Rosenow) may produce ulcer.

The number of cases of "chronic" ulcer and "recurring" ulcer could in all probability be reduced if the diet suitable for the condition were maintained rigidly and for a much greater length of time than is customary. Such a procedure usually meets with difficulties, and the carrying out of a rigid routine of suitable diet cannot always be enforced.

Gastric Ulcer.—The majority of gastric ulcer cases are drawn from the class of working girls who have very little choice as regards food, and no opportunity for rest, which is absolutely essential to the cure of an ulcer, whether situated externally or in the stomach.

Hawkins for the purpose of dietetic treatment of gastric ulcer divides them arbitrarily into several classes:

1. Very frequently the patient comes under treatment within a few hours after an attack of hematemesis.
2. Sometimes days or weeks have elapsed since the hematemesis.
3. There is often a long antecedent stage, during which, in the absence of hematemesis, an ulcer is suspected but cannot be recognized with certainty.
4. Often hematemesis has occurred on several occasions in the past, or after one previous hemorrhage there has been continual pain after food, so that the story may run back for years. Though operative measures should be undertaken in such cases, dietetic treatment is still a necessity.
5. The patient may be suffering entirely from one or more sequelæ consequent on the healing of an ulcer, such as pyloric stenosis, perigastric adhesion and hour-glass contraction.

6. In a small proportion of cases, about ten per cent of hospital admissions, perforation occurs without previous symptoms of ulcer, and after recovery from operation dietetic treatment is as important as in any of the other classes.

DIET IN GASTRIC ULCER.—Treatment by means of diet in all these classes aims at giving rest to the stomach. Obviously, functional rest is of the most vital importance to an ulcerated stomach, for movements of the stomach wall will delay healing of the ulcer. Furthermore, since secretion and motility receive their greatest stimulus from the ingestion of food, the selection of an appropriate dietary is most important. This food should, of course, be of a nature which will lessen the hyperacidity, which is a disturbing concomitant of gastric ulcer.

Immediately after hematemesis, complete rest is indicated and this can only be effectually obtained by prohibiting food by the mouth and by adopting strict rectal feeding. No food whatever should be allowed by the mouth, and even giving small pieces of ice is a form of treatment not to be advocated. During these first few days, the sole object must be to avoid mechanical disturbance of the thrombus during the short time needed for its organization.

Opinions vary as to the length of time strict rectal feeding should be prescribed. Fenwick thinks that in most instances, nutritive enemata should be employed for eight or ten days, during which time the patient is encouraged to wash out the mouth frequently with an antiseptic solution and to suck a rubber teat with a view of stimulating the flow of saliva. Some physicians maintain strict rectal feeding for long periods, two or three weeks in some cases. Lenhartz, influenced by the malnutrition and other evils which attend rectal feeding, has discarded it. Even on the day of hemorrhage he allows seven to ten ounces of iced milk in spoonfuls and from two to four beaten eggs in the twenty-four hours.

Hawkins is of the opinion that strict rectal feeding is necessary for a certain time after hemorrhage and that, unless it is too prolonged, the advantage gained outweighs any possible malnutrition. He further thinks that, while each case must be considered on its merits, and no definite rule laid down, at least three or four days should elapse after hemorrhage before any food or fluid can be safely given by the mouth. As a rule, hemorrhage seldom recurs after an interval of four clear days. In cases of recurring hemorrhage it sometimes happens that rectal feeding must be continued longer than desirable from several points of view, but after all, it is a choice between two evils and the immediate object is manifestly the arrest of bleeding and organization of clot.

Opinions differ as to the relative value of various enemata, but accord-

ing to Fenwick there can be no doubt that the administration of fifteen ounces to a pint of fluid every six hours is infinitely preferable to the old-fashioned injection of two ounces every three hours. The method of injection and, in fact, nutritive enemata generally have been extensively considered. (*See Volume III, Chapter XXVI.*)

In the majority of cases, simple peptonized milk answers every purpose, but some authorities recommend peptonized milk gruel, beef tea mixed with raw eggs and a little brandy or milk containing pure glucose, powdered peptones (somatose), or powdered casein (plasmon, nutritin). The latter ingredients should not be used in a concentration greater than 10 per cent. The following are examples of such enemata: 1. Somatose, 300 gr.: glucose, 300 gr.: common salt, 16 gr.: water, 7 fluid ounces. 2. The yolks of two eggs, 400 gr. of pure glucose; 8 gr. of salt and 10 fluid ounces of peptonized milk. To supplement rectal feeding the subcutaneous injection of pure sterilized olive oil has been recommended, one-half ounce of which is introduced beneath the skin night and morning. A sterilized solution of pure glucose has also been used in a similar manner.

After the stomach has rested for a few days, feeding by the mouth on a limited scale may be commenced. But even now caution must be observed, for each individual case requires careful supervision. For at least two weeks milk, or milk and lime water, or barley water should be given. The value of milk in cases of chronic gastric ulcer is conceded to be of threefold kind; it does not cause mechanical irritation of the sore, it induces the least secretion of gastric juice of any protein food, and it fixes a large proportion of the free acid. In these various ways, milk serves to relieve the symptoms of pain and acidity and also aids in the repair of the ulcer.

During the first twenty-four hours, of a mixture of twenty-one ounces of milk and nine ounces of lime water or barley water, two ounces may be given every two hours for nine doses; on the second or third day, if no pain occurs while rectal feeding is continued on a reduced scale, thirty ounces of this mixture may be given in five-ounce doses every three hours for six doses.

Fenwick recommends rectal alimentation alone for two weeks and then feeding by the mouth. He prescribes at first from two to four ounces of milk warmed to a temperature of 70° F. every two hours and subsequently three to four pints in the course of each twenty-four hours.

Within six or seven days of the last sign of bleeding, the patient should be taking food to the value of about 420 calories. Hawkins points

MODIFIED DIET TABLE IN HEMORRHAGE—FROM GASTRIC ULCER (KEMP)

	Days Thereafter													
	2	3	4	5	6	7	8	9	10	11	12	13	14	
First day, that of hemorrhage														
Gelatin, 3 j to ij (4.0-8.0) of a 5 to 10 per cent solution every half hour for ten to twelve hours.														
Then 3 ss to j (16.0-32.0) every two to three hours to total 200 to 300 gm.	100	100	100	100	100	100	0	0	0	0	0	0	0	
Eggs ¹ (2 whites) on first day; entire thereafter	1	2	3	4	5	6	7	8	8	8	8	8	8	
Sugar with eggs, none	0	0	20	20	20	30	30	30	40	40	40	50	50	
Milk (c.c.) none	200	300	400	500	600	700	800	900	1000	1000	1000	1000	1000	
Cream (c.c.) none	0	0	0	0	0	25	25	25	25	25	25	25	25	
Milk, rice (gm.) none	0	0	0	0	0	0	100	100	100	100	200	200	300	
Zwieback (gm.) none	0	0	0	0	0	0	20	20	40	40	40	60	80	
Butter (gm.) none	0	0	0	0	0	0	10	20	25	25	25	50	50	
Calories—200 to 400	399	930	973	1272	1467	1765	2413	2476	2748	2822	3098	3349	3519	

¹ Eggs should be taken raw and well beaten, for ten days, and after that 4 raw and 4 soft boiled.

out that as enough milk cannot be given, owing to its bulk and weight, to supply the nutriment necessary for restoration of health, it is best to add some casein preparation, such as protein, nutrose, etc.

Kemp draws attention to the fact that Lenhartz does not approve of the method of entrenched milk feeding in the treatment of gastric ulcer, that the high acidity is not measurably lessened, and that if the patients are in poor physical condition consequent upon one or more hemorrhages, often, indeed, in collapse, the "starvation treatment," ice and nutrient enemata and later insufficient milk feeding not only maintain the patient in his anemic state, but may even drag him into serious inanition. Such an undermined constitution hardly favors the speedy healing of an ulcer. He advises another dietetic treatment, one that will especially combat the hyperchlorhydria and reinforce the enfeebled and anemic state of the patient.

The concentrated egg albumin diet was tried. The following is the tabulated regimen:

Absolute rest in bed for at least four weeks; all mental excitement to be avoided. On the first day, even when hematemesis has occurred, the patient receives between six to nine ounces of iced milk, given in spoonfuls, and from two to four beaten raw eggs within the first twenty-four hours. At the same time bismuth subnitrate is given twice or three times a day, 30 grains per dose, and continued for ten days. The eggs are beaten up entire with a little sugar, and the cup containing them is placed in a dish filled with ice, so that they remain cold. The food at once "binds" the supersecreted acid, thereby rapidly relieves the pain and checks the troublesome vomiting. The fat which is present in the egg yolk also inhibits the secretion of hydrochloric acid. The portion of milk is increased daily by 3 oz. and at the same time one additional egg is given, so that at the end of the first week the patient is receiving 25 oz. of milk and from six to eight eggs. Both these foods are now continued daily in the same amount for another week. No more than one liter of milk a day is allowed at any time. Besides milk and eggs, some raw chopped meat is given from the fourth to the eighth day, usually on the sixth, nine grams per diem, in small divided doses, stirred up with the eggs or given alone; the day after, eighteen grams, and later possibly more if well digested. The patient is now able to take some well cooked rice and a few softened zwieback. In the third week quite a mixed diet is tolerated, the meat being given now well cooked or lightly broiled.

Harris (11) has modified and the author has simplified and Americanized the Lenhartz ulcer dietary, so that it now shows the quantities of the component parts of the diet as well as the caloric value and can be carried out with greater accuracy by the average nurse than that which was originally advised. The diet as originally outlined by Lenhartz consisted principally of eggs, milk, cane sugar, scraped beef, raw ham, rice

and zwieback, which are separately prepared and given in definite quantities (grams) every hour from 7 A.M. until 9 P.M. for ten days.

The Americanized Lenhartz dietary is prepared as follows:

The proportion of 1 egg and $1\frac{1}{2}$ ounces of cream to 4 ounces of milk is given every hour from 7 A.M. to 7 P.M., in gradually increasing quantities, beginning with $\frac{1}{2}$ ounce the first day and increasing $\frac{1}{2}$ ounce each day. It requires six days to get up to 3 ounces at each feeding, and the quantity is kept at 3 ounces for four days. From the seventh to the tenth day a soft cooked egg and two table-spoonsful of strained oatmeal may be given with the feeding at 7 A.M. and 7 P.M., and at 1 P.M. two tablespoonfuls of scraped beef, lightly broiled, and two table-spoonsful of thoroughly cooked rice with butter.

After ten days, until the fifteenth day, 3 ounces of the egg, milk and cream mixture are given at 10 A.M. and 4 P.M., and 2 ounces of strained oatmeal with cream and sugar and one or two soft-boiled eggs.

AMERICANIZED LENHARTZ DIETARY FOR GASTRIC AND DUODENAL ULCER

First Day:

Egg.....	One	50 grams	80 calories
Cream.....	$1\frac{1}{2}$ ounces	45 "	162 "
Milk.....	4 ounces	120 c.c.	78 "

Total Calories 320

$\frac{1}{2}$ ounce of this is given every hour from 7 A.M. to 7 P.M.

Second Day:

Eggs.....	Two	100 grams	160 calories
Cream.....	3 ounces	90 "	324 "
Milk.....	8 "	240 c.c.	157 "

Total Calories..... 641

1 ounce of this is given every hour from 7 A.M. to 7 P.M.

Third Day:

Eggs.....	Three	150 grams	240 calories
Cream.....	$4\frac{1}{2}$ ounces	135 "	486 "
Milk.....	12 "	360 c.c.	235 "

Total Calories..... 961

$1\frac{1}{2}$ ounces of this mixture is given every hour from 7 A.M. to 7 P.M.

Fourth Day:

Eggs.....	Four	200 grams	320 calories
Cream.....	6 ounces	180 "	648 "
Milk.....	16 "	480 c.c.	314 "

Total Calories.....1,282

2 ounces of this mixture is given every hour from 7 A.M. to 7 P.M.

AMERICANIZED LENHARTZ DIETARY FOR GASTRIC AND DUODENAL ULCER—(Continued)

Fifth Day:

Eggs.....	Five	250 grams	400 calories
Cream.....	7½ ounces	225 "	810 "
Milk.....	20 "	600 c.c.	392 "

Total Calories1,602

2½ ounces are given every hour from 7 A.M. to 7 P.M.

Sixth Day:

Eggs.....	Six	300 grams	480 calories
Cream.....	9 ounces	270 "	972 "
Milk.....	24 "	720 c.c.	470 "

Total Calories1,922

3 ounces every hour from 7 A.M. to 7 P.M.

*Seventh to Tenth Day:**Breakfast:*

Strained Oatmeal.....	2 heaping tablespoons	100 grams	201 calories
Cream.....	2 ounces	60 "	216 "
Sugar.....	1 teaspoonful	10 "	41 "
Soft-boiled egg.....	1	50 "	80 "

Total Calories 538

Eggs.....	Three	150 grams	240 calories
Cream.....	3 ounces	90 "	324 "
Milk.....	20 "	600 c.c.	392 "

Total Calories 956

3 ounces of this mixture to be given at 8, 9, 10, 11, 12 A.M., and 2, 3, 4, 5, 6 P.M.

At 1 P.M.

Lightly broiled scraped beef	1 heaping tablespoon	50 grams	92 calories
Boiled rice (dry).....	1 " "	100 "	112 "
Milk (whole).....	3 ounces	90 c.c.	60 "

Total Calories 264

At 7 P.M.

Strained oatmeal.....	2 heaping tablespoons	100 grams	201 calories
Cream.....	2 ounces	60 "	216 "
Sugar.....	1 teaspoonful	10 "	41 "
Soft-boiled egg.....	One	50 "	80 "

Total Calories 538

Total Calories for Day2,296

AMERICANIZED LENHARTZ DIETARY FOR GASTRIC AND DUODENAL ULCER—(Continued)

Eleventh to Fourteenth Day:

Breakfast—7 A.M.

Soft-boiled eggs.....	Two	100 grams	160 calories
Dry toast.....	1 slice	20 "	62 "
Butter.....	1 square	15 "	120 "
Strained oatmeal.....	2 heaping tablespoons	100 "	200 "
Cream.....	3 ounces	90 "	324 "
Sugar.....	1 teaspoonful	10 "	41 "

Total Calories..... 907

Lunch—10 A.M.

Egg.....	One	50 grams	60 calories
Cream.....	1 ounce	30 "	108 "
Milk.....	3 ounces	90 "	59 "

Total Calories..... 247

Dinner—1 P.M.

Broiled scraped beef.....	2 heaping tablespoons	100 grams	184 calories
Dry toast.....	1 slice	20 "	62 "
Butter.....	1 square	15 "	120 "
Boiled rice (dry).....	2 tablespoons	100 "	112 "
Ice cream.....	2 heaping tablespoons	100 "	189 "

Total Calories..... 667

Tea—4 P.M.

Egg.....	One	50 grams	80 calories
Cream.....	1 ounce	30 "	108 "
Milk.....	3 ounces	90 "	59 "

Total Calories..... 247

Supper—7 P.M.

Soft-boiled eggs.....	Two	100 grams	160 calories
Dry toast.....	1 slice	20 "	62 "
Butter.....	1 square	15 "	120 "
Strained oatmeal.....	2 tablespoons	100 "	200 "
Cream.....	3 ounces	90 "	324 "
Sugar.....	1 teaspoonful	10 "	41 "

Total Calories..... 907

Total Calories for Day2,975

Fifteenth to Twenty-first Day:

The dietary should be the same as just outlined from eleventh to fourteenth day, with the exception that the amount of cereal, cream and chicken or beef may be increased, and a baked white potato may be added to the rice—and gelatin or boiled custard substituted for the ice cream; one egg and four ounces of whole milk may be given at 10 A.M. and at 4 P.M. This dietary will furnish approximately about 3,200 calories.

AMERICANIZED LENHARTZ DIETARY FOR GASTRIC AND DUODENAL ULCER—(*Continued*)

From the *Third to Sixth Week*:

The dietary should be much the same as the third week, except that strained orange juice may be given at breakfast, and purées of beans, peas and potatoes may be allowed at dinner; soft green vegetables mashed through a sieve may also be added. This dietary will yield energy or fuel value about 3,600 calories.

NOTE.—The egg, milk and cream mixture should be kept in a covered dish with ice packed around it. The amount for each feeding should be given slowly and with a spoon, and with the same exactness and regularity as if it were medicine.

The scraped beef should be made into a patty and lightly broiled with a little butter and salt.

The rice and oatmeal should be cooked for several hours.

The dry toast should be in slices about 4 x 4 x ½ inches in size. The crust should be removed and the patient instructed to chew it until it becomes liquid with the saliva.

After the sixth week, and for a year thereafter, the dietary for the ulcer patient should be almost identical, as indicated in hyperchlorhydria (*see* page 37). Particular care should be exercised in selecting a highly nutritious, easily digested aliment yielding from 3,200 to 3,600 calories, because the building up process in ulcer is as important as in tuberculosis. It is a matter of observation among clinicians that ulcer, like tuberculosis, occurs most frequently in persons poorly nourished. Prior to the appearance of ulcer symptoms, and if recurrences are to be prevented, the ulcer patient must be supplied with a highly nutritious, well-balanced dietary. He should avoid highly seasoned foods. Pepper, spices, condiments and pickles should be eliminated from his dietary, as should also hot bread and fried foods, most sweets, as pies, cakes, syrup, etc., tough meats, corn, fruit and vegetables containing hard seed or tough skins. Coffee, tea, coca-cola and other caffeine beverages, wines, liquors, beer or other alcoholic drinks, since they increase gastric acidity, should be tabooed by the recovered ulcer patient. Tobacco, in any form, is contra-indicated for the same reason.

In cases where there is retention of food, lavage with a solution of sodium bicarbonate, 5ss to two quarts of water, is given at 9 P.M., and if there is excessive secretion, as in gastro-succorhea, which is sometimes associated with ulcer, lavage is given in the early morning one-half hour before beginning the nourishment.

It seems to have been proved that nutrient enemata supply but little nutriment, and besides, when given frequently, excite the gastro-intestinal tract to peristaltic activity, and may thus induce renewed bleeding.

Thus there is a good deal in favor of the Lénhartz method. On the other hand, it appears that feeding by the mouth is far more likely than enemata to renew bleeding and hinder organization of the clot. On the whole, then, the starvation and semi-starvation method and rectal feeding seem more conducive to the healing of the ulcer and consequently likely to be followed by the more satisfactory results.¹ On or about the tenth day, the diet may be strengthened by the addition of eggs and farinaceous materials. Wheaten flour boiled with milk is usually very acceptable; tapioca, rice, grated biscuit, toast, bread and milk are easily digested.

As regards the second stage of treatment, there is some difference of opinion with respect to the relative merits of a carbohydrate or protein diet. As in hyperacidity, the former tends to minimize the secretion of acid, while the latter tends to increase the secretion, and, at the same time, to neutralize it. Kemp advocates Lénhartz' method.

The author is of the opinion that the use of eggs and meat extracts should be still further postponed, and that for this second stage, which should certainly be of fourteen days' duration at least, carbohydrates alone should be added to the diet. There is no proof that more protein will hasten cicatrization, and in his experience a recurrence of pain or discomfort is often noted on the addition of eggs at this stage.

The diet at this stage may be arranged on the following plan:

DIETARY FOR ULCER OF THE STOMACH (Wegele)

DIET I

(To be followed at least ten days)

		Protein	Fat	Carbo- hydrates
<i>Morning:</i>	250 gm. milk.....	8.50	9.00	12.0
	2 cakes (5 gm. each).....	1.10	.50	7.3
10 A.M.	250 gm. milk.....	8.50	9.00	12.0
	1 cake.....	0.60	0.25	3.7
12 M.	150 gm. bouillon.....	0.75	0.45	0.9
	50 " meat solution (or egg).....	8.50	3.00	3.5
4 P.M.	250 " milk.....	8.50	9.00	12.0
	2 cakes.....	1.10	0.50	7.3
	50 gm. meat solution or 1 egg.....	8.50	3.00	3.5
	2 cakes.....	1.10	0.50	7.3
Total.....		47.90	35.65	70.4
Calories.....		200	330	330
TOTAL CALORIES FOR DAY.....				860

¹See Volume III, Chapter XXVI.

DIET IN DISEASES OF THE STOMACH

DIETARY FOR ULCER OF THE STOMACH
(Wegele)—(Continued)

DIET II

(To be followed at least seven days)

	Protein	Fat	Carbo- hydrates
<i>Morning:</i> 250 gm. milk.....	8.5	9.00	12.0
3 cakes.....	1.8	0.75	11.1
10 A.M. 200 gm. bouillon.....	3.2	4.40	3.2
1 egg.....	6.0	5.00	
<i>Noon:</i> 1 boiled pigeon.....	22.0	1.00	0.7
About 200 gm. rice in bouillon.....	5.0	2.00	40.0
4 P.M. 250 gm. milk.....	8.5	9.00	12.0
2 cakes.....	1.1	6.50	7.3
8 P.M. 150 gm. bouillon.....	6.4	6.70	9.0
100 " sweetbreads.....	28.0	0.40	
Total.....	90.5	38.75	95.3
Calories.....	370	350	390

ENTIRE NUMBER OF CALORIES1,100

DIET III

(To be followed at least five days)

	Protein	Fat	Carbo- hydrates
<i>Morning:</i> 2 cups of tea or coffee with 100 gm. of milk.....	3.4	3.60	4.8
20 gm. sugar.....	0.5		18.2
3 cakes.....	1.8	0.75	11.1
10 A.M. 200 gm. bouillon.....	3.2	4.40	3.2
1 egg.....	6.0	5.00	
<i>Noon:</i> 200 gm. soup.....	3.2	6.00	17.0
150 gm. beefsteak.....	31.0	2.20	
100 " mashed potatoes.....	3.1	0.85	21.3
4 P.M. 2 cups tea with 100 gm. milk.....	3.4	3.60	4.8
20 gm. sugar.....	0.5		18.2
3 cakes.....	1.8	0.75	11.1
<i>Evening:</i> 100 gm. scraped ham.....	25.0	8.10	
200 " soup.....	3.2	6.00	17.0
Total.....	86.1	41.25	126.7
Calories.....	350	380	520

ENTIRE NUMBER OF CALORIES1,250

DIETARY FOR ULCER OF THE STOMACH
(Wegele)—(*Continued*)

DIET IV

(To be followed at least one week)

		Protein	Fat	Carbo- hydrates
<i>Morning:</i>	2 cups tea or coffee, 100 gm. milk....	3.4	3.6	4.8
	20 gm. sugar.....	0.5		18.2
	Milk toast (50 gm.).....	4.5	0.5	29.0
10 A.M.	200 gm. bouillon.....	3.2	4.4	3.2
	1 egg.....	6.0	5.0	
<i>Noon:</i>	200 gm. soup.....	3.2	6.0	17.0
	150 " roast fowl.....	27.6	14.0	1.7
	100 " carrots or spinach.....	1.0	0.2	8.1
	200 " light flour food.....	9.0	8.4	45.0
4 P.M.	2 cups of tea with 100 gm. milk.....	3.4	3.6	4.8
	20 gm. sugar.....	0.5		18.2
	Milk toast.....	4.5	0.5	29.0
<i>Evening:</i>	100 gm. cold roast meat.....	38.2	2.8	
	150 " tapioca.....	7.0	5.0	8.0
10 P.M.	250 " milk.....	8.5	9.0	12.0
Total.....		120.5	63.0	199.0
Calories.....		495	585	815
ENTIRE NUMBER OF CALORIES.....				1,900

Herbert P. Hawkins, after considering at some length the dietetic treatment of gastric and duodenal ulcer, recommends the following as suggestions in planning suitable dietaries in these conditions:

NUMBER I

SUITABLE DIETARY FOR GASTRIC AND DUODENAL ULCER

<i>Breakfast</i> —6 A.M.		Calories
	Milk and plasmon, 8 oz.....	257
<i>Forenoon Lunch</i> —8 A.M.		
	Milk mixture, 6 oz.; arrowroot, 2½ oz.; thin bread and butter, 1 oz.....	272
<i>Dinner</i> —12 M.		
	Milk and plasmon, 8 oz.; thin bread and butter, 1 oz.....	392
<i>Afternoon Lunch</i> —4 P.M.		
	Cornflour blancmange, 2½ oz.; milk mixture, 6 oz.; thin bread and butter, 1 oz.	442
<i>Supper</i> —8 P.M.		
	Milk mixture, 6 oz.; arrowroot, 2½ oz.....	157
10 P.M.		
	Milk mixture, 8 oz.....	180
TOTAL CALORIES.....		1,700

At the end of four weeks, if such a diet can be taken without discomfort, it is likely that the cicatrization of the ulcer is proceeding satisfactorily and further trouble need not be feared.

A sample diet supplying 1,800 calories may be thus constructed:

NUMBER II

DIETARY FOR GASTRIC AND DUODENAL ULCER

	Calories
7 A.M.	
Two rusks; milk, 8 oz., flavored with coffee.....	287
<i>Breakfast</i> , 9 A.M.	
Cocoa made with milk, 8 oz.; 1 egg lightly boiled or poached; thin bread and butter, 1 oz.....	480
<i>Dinner</i> —1 P.M.	
Milk soup, 8 oz.; milk pudding or custard with 1 egg, 2½ oz.; thin bread and butter, 1 oz.; milk, 8 oz.....	589
<i>Afternoon Lunch</i> —4 P.M.	
Two rusks and milk, 8 oz.....	217
<i>Supper</i> —6 P.M.	
Chicken broth, 6 oz.; milk pudding or custard with 1 egg, 2½ oz. (or one egg lightly boiled or poached and junket made from 10 oz. of milk); thin bread and butter, 1 oz.; milk, 8 oz.....	681
8 P.M.	
Two rusks and milk, 8 oz.....	217
TOTAL CALORIES	2,471

A diet of this character should be persisted in for at least fourteen days, and in many cases it would be erring on the side of a wise caution to continue it for a longer period. (*See also dietary, Volume III, Chapter XXVIII.*)

The final diet should have a value of 2,500 calories and should not be commenced until six weeks after the initiation of mouth feeding. Considerable variety is possible at this stage, and fish and chicken may enter into the dietary. Small amounts should be taken at a time, hard particles should be avoided, and cellulose should be kept at a low level. When white fish has been taken without discomfort, a somewhat large variety of food may be eaten, although milk, carbohydrates and eggs must still form a large part of the diet. Fish (sole, plaice, whiting or haddock), sweetbreads, chicken, pigeon and pheasant may be added, with cauliflower or potato. This diet should be adhered to for three months. The longer the patient abstains from meat, tea and alcohol, the better chance he will have of an uninterrupted and complete recovery.

As was pointed out previously in this section, the majority of those who suffer from ulcers of the stomach are working girls, for whom, outside of the hospital, such a diet is unattainable. When the patient leaves the hospital, which she generally does before she is well, she should be provided with a diet list as above, and although she will probably not be able to obtain chicken or fish, she may resume work on a diet of milk, carbohydrates, butter and eggs. As much care regarding the diet must be observed in this last stage of treatment as in the former stages. Pain and discomfort after the ingestion of certain articles of food will still occur, and the necessary alteration in details of the diet must be made. This does not necessarily mean that the ulcer is unhealed. In neurasthenic patients, hyperesthesia of the gastric mucosa may persist, in consequence of which pain is felt as soon as certain articles of food enter the stomach.

FINAL DIET FOR GASTRIC ULCER¹

Breakfast—8 A.M.

Milk flavored with coffee, 8 oz. (or cocoa made with milk); 1 or 2 eggs lightly boiled, poached or scrambled; thin bread and butter, 2 oz. (or rusks and butter).

Forenoon Lunch—10.30 A.M.

Milk, 8 oz.; a rusk.

Dinner—1 P.M.

Sole, boiled, fried or filleted, or fishcake, 3 or 4 oz. (or quenelles of haddock or sweetbread with white sauce); cauliflower, 2 oz. (or potato purée or both); milk pudding made with egg, 2 or 3 oz. (or custard or savory omelet); thin bread and butter, 2 oz.; milk, 8 oz.

Afternoon Lunch—4.30 P.M.

As at 10.30 A.M.

Supper—7 P.M.

Clear soup, or milk soup, chicken broth, mutton broth, 6 oz.; chicken panada or soufflés, 3 oz. (or veal quenelles); potato purée, 2 oz.; milk pudding, 2 or 3 oz. (or custard or junket and cream); thin bread and butter, 2 oz.; milk, 8 oz.

10 P.M.

As at 4.30 P.M. (or Benger's food, 6 oz.).

¹ This dietary will furnish about 2,900 calories.

Chronic ulcer of the stomach sometimes persists for months and years.

The dietetic treatment of gastric ulcer following hematemesis has already been covered. Absolute rest in bed and the dietary as tabulated by Kemp is the ideal treatment. Of course, this treatment can be augmented by rectal alimentation and later by duodenal alimentation.¹ He does not believe in duodenal alimentation, and thinks that the tube as a foreign

¹ Volume III, Chapter XXVI, "Special Methods of Feeding."

body, irritates the ulcer. Where great thirst is complained of, the administration of ten to twenty ounces of normal saline solution by the proctoclysis thermos bottle described by Kemp will give great relief. If the state of the patient is one of great prostration, an intravenous injection of normal saline may be administered. A suitable diet at the end of the first week of oral feeding will be as follows: two pints of milk diluted one part in six, given in six-ounce feedings administered every three hours, six meals daily. Of course this is an insufficient alimentation and requires to be supplemented with two rectal feedings daily (*see* "Special Methods of Feeding," Volume III, Chapter XXVI). During the second week, if there is hyperacidity, the alimentation may be cautiously increased by the addition of a simple nutritious protein dietary of eggs and meat extracts. If there is no indication of hyperacidity, the dietary may be advantageously confined to milk and carbohydrates. For convenience, these two dietaries are tabulated below:

NUMBER I

PROTEIN AND MILK DIET

		Calories
7	A.M. 6 ounces of milk diluted with Vichy.....	135
8.30	A.M. 1 cup of milk with one egg beaten into it.....	250
11	A.M. 4 ounces of beef juice.....	31
1	P.M. 6 ounces of milk.....	135
4	P.M. 8 ounces egg custard.....	325
7	P.M. Milk junket and cream.....	125
10	P.M. Beef tea with toast.....	100
TOTAL CALORIES.....		1,101

NUMBER II

CARBOHYDRATE AND MILK DIET

		Calories
7	A.M. 8 ounces of milk.....	170
8.30	A.M. 6 ounces of milk and thin slice of toast.....	210
11	A.M. A glass of milk.....	170
	Bread and butter.....	225
4	P.M. Arrowroot boiled in 6 ounces of milk and cream added.....	205
8	P.M. Junket and cream.....	125
	8 ounces of egg custard.....	325
10	P.M. 8 ounces of milk diluted with Vichy.....	170
	Bread and butter.....	225
TOTAL CALORIES.....		1,825

Toward the middle of the third week, it will be possible to abandon the rectal feeding and gradually increase the nourishment given by the mouth. Beef tea, meat extracts, white of egg may be utilized and the lighter forms of milk puddings and egg custards may be ordered. These should be given tentatively. A recurrence of pain or discomfort after ingesting proteins indicates the necessity for withholding protein in all forms. A suitable dietary near the end of the third week is one formulated by Watson, which has admirably well served the author in the treatment of these cases:

DIET TOWARDS END OF THIRD WEEK

	Calories
7 A.M. 10 ounces milk with biscuit.....	175
9 A.M. 8 ounces cocoa made with milk; bread and butter; toast and butter.	400
1 P.M. Soup from a vegetable stock, thickened with milk and cream, 8 ounces; or a weak meat broth, all the vegetables carefully strained.	100
Light milk pudding or custard, or blanchmange.....	150
Milk to drink, 8 ounces.....	157
4 P.M. 8 ounces milk, flavored with freshly made weak tea; a little cream, sponge biscuit, or rusk and butter and toast.....	457
7 P.M. Soup, as under the 1 o'clock meal; or a boiled or scrambled egg....	100
Pudding—a custard, junket, or well-made milk pudding.....	150
10 P.M. 8 ounces milk, with Horlick's malted milk, sponge biscuit, or rusk...	200
TOTAL CALORIES.....	1,889

Where the patient seems to do well on the above dietary, the author has found the cautious addition of eggs, fish and chicken with the addition of soups and a little vegetables to be advantageous, but should the fish or chicken lead to a recurrence of abdominal pain, these articles of diet should be immediately restricted. There is very seldom any difficulty with fish and chicken at this stage, provided they are properly prepared and given in the most suitable forms. In the author's experience, a convalescent diet may be prescribed about the fourth week. The following seems to be suitable in most cases:

SUITABLE DIETARY TOWARDS THE END OF THE FOURTH WEEK

	Calories
<i>Breakfast</i> —8 A.M.	
8 ounces of milk flavored with tea, coffee, or cocoa.....	170
Toast or rusk with butter.....	225
Poached egg.....	80
<i>Forenoon Lunch</i> —11 A.M.	
8 ounces milk with one oz. Horlick's malted milk, and 1 biscuit.....	310

	Calories
<i>Dinner</i> —1 P.M.	
Entrées, oysters, fish, steamed or plain boiled, chicken or game soufflé, tripe or sweetbread	300
Mashed potato or cauliflower, milk pudding or egg custard, 8 ounces milk	170
Dry toast with butter.	225
<i>Afternoon Lunch</i> —4.30 P.M.	
1 cup of freshly made tea with milk, and a biscuit.....	200
<i>Supper</i> —7.30 P.M.	
A plate of light consommé, strained mutton broth, or chicken soup.....	150
Chicken, tripe or sweetbread, milk pudding with cream.....	300
A glass of milk.....	157
9.30 P.M.	
A glass of milk and a cracker.....	175
TOTAL CALORIES	2,462

In all such cases of chronic gastric ulcer, when possible, operative measures should be instituted, and after the performance of gastro-enterostomy, the fact must always be kept in mind that a thick and walled ulcer is present. Malnutrition is generally very evident in these cases and therefore the diet must be as liberal as safety will allow.

POST-OPERATIVE DIET.—It is good practice on the first day after operation to give milk diluted (2 to 1) with lime water or barley water in one-ounce doses every hour. On the second day, milk mixtures (4 to 1) may be given in five-ounce doses every two hours, and on the third day, some carbohydrate may be added in the form of Benger's food or arrowroot. A full milk carbohydrate diet may be reached in a week. In many cases fish and chicken can be taken at the end of the second week. But for many months thereafter, it will be wise to direct the patient to adhere to the final diet list already detailed. For early postoperative feeding Kemp prefers strained barley and rice water to milk.

Duodenal Ulcer.—The dietetic treatment of duodenal ulcer is, in a general way, the same as that of gastric ulcer, with one important difference. The duodenum is not disturbed so frequently by foodstuffs as the stomach, and the churning movements of the stomach, which tend to prolong the healing of gastric ulcer, are absent in the duodenum. In consequence, the increase of food may be more rapid.

Dysphagia.—In the dietetic treatment of dysphagia the fact must be taken into consideration that the condition is due to an obstruction in the mouth, pharynx or esophagus. Consequently, deglutition, which is both difficult and painful, must be obviated as far as possible by giving such food as will require the smallest amount of effort to swallow. Accord-

ingly, concentrated food must be given either in liquid or semi-liquid form. Ruhräh recommends milk, egg albumin and concentrated beef preparations. When, however, food cannot be swallowed in amounts sufficient to properly nourish the patient, recourse must be had to the stomach tube. By this method, broths, gruel, milk and so on can be passed into the stomach.

Gastroptosis.—The stomach may undergo displacement, upward, laterally, or downward. In cases of upward displacement, strict moderation should be exercised with regard to the ingestion of starches and sugars, while care must be taken to avoid excess of fluid with the meals. Especially should effervescing drinks be prohibited. Green vegetables should be eaten sparingly.

Even in cases of vertical displacement, particularly with the water trap, or fishhook form, the question of diet is important. Mechanical support, with weight increase, is of chief importance to effect a cure. Light exercise, providing no weight loss occurs, and rarely surgery may be required. With severe gastroptosis, stagnation of the contents of the stomach, with a sensation of weight, fullness, oppression, and nausea or vomiting may occur, and these symptoms result in the avoidance of one article of food after another until malnutrition is unmistakable. As in dilatation of the stomach, the object of dietetic treatment should be to provide a sufficient supply of easily digested food which leaves the stomach in the shortest possible space of time. Kemp thinks that gastric analysis is indicated in every case of gastroptosis, as hyperacidity, hypacidity, or even achylia may be present, which would modify the diet.

DIET IN GASTROPTOSIS.—The food must be adapted to the necessities of a given case and existing complications. When the intestinal functions are normal and the gastric compensation good, all that is required is a full diet of easily digested substances. Moderately cooked and tender meats, fish, game, eggs, sweetbreads, tripe, sheep's head, calf's head and feet, well-boiled cereals, farinaceous puddings and a small amount of fruit may be allowed. The patient should be encouraged to drink milk with meals and to eat plenty of cream and fats. Raw vegetables, pastry, sauces, pickles and cheese are prohibited. When emaciation is a marked feature of the condition and neurasthenia is present, the "rest cure" is of the utmost value. A milk diet is frequently indicated, five pints of milk, mixed with a small proportion of lime water, being given in divided doses during the course of the day. This alone would be insufficient nutrition, so that cream, butter and the yolks of 6 to 8 eggs (raw) daily should be added to improve weight. Hawkins advises that all meat should be

finely minced and rubbed through a sieve. Vegetables such as cauliflower, spinach and asparagus may be allowed.

Meals should be small and frequent, and as in dilatation only that amount of fluid should be taken which is necessary to produce the requisite consistence of the stomach contents. In all cases it is important that the patient should lie down for an hour after meals, with the thorax on the same plane as the abdomen, and occasionally further benefit is obtained if the body is slightly inclined to the right side.

In a small number of cases, with a moderate degree of descent of the stomach, the actual symptoms depend on hyperacidity. In these patients the line of treatment suggested in that condition will ordinarily give relief. We repeat that certain general principles must be followed in the dietetic treatment of gastropotosis. If there is hyperchlorhydria, plenty of albuminous foods and fats and diminished starchy foods should be given, with frequent feedings; avoidance of acids, spices and alcohol. Hypochlorhydria or achylia calls for little meat and an abundance of carbohydrates and fats. Not more than 8 oz. of fluid should be taken at a time. If the patient is not confined to bed, a rest of fifteen to thirty minutes after each meal, if possible, is recommended. The three chief meals should be taken daily at

8	A.M.	} With intermediate feedings at.....	{	10.30 A.M.
1	P.M.			3.30 P.M.
6.30	P.M.			and often at 9.30 P.M.

John Russell's method, as employed in the treatment of tuberculosis, is of value in some cases. The foods especially useful for increasing weight and serviceable for the interval feedings are milk, raw eggs, one ounce cream in eight ounces milk; kumiss, matzoon, bacillae, lactone, buttermilk, crackers or bread with plenty of butter. Raw eggs can be given, beaten up in milk. It is well to commence with one or two daily and increase gradually to six or eight a day. One could give, for example, at the intermediate feeding:

10.30 A.M. Milk, 8 ounces, with 2 raw eggs.

3.30 P.M. Kumiss, 8 ounces.

9.30 P.M. Same as at 3.30 P.M., or milk with cream, and vary the methods.

Two soft-boiled eggs can be given for breakfast.

Gastropotosis with Myasthenia.—When gastropotosis is accompanied by myasthenia, a diet suited to this important complication is indicated. According to Fenwick, in this complication, sugars and fats in excess are always injurious, owing to the tendency of the former to ferment and of

the latter to stagnate in the stomach. Butter and cream are allowed in moderation, as well as rice and oatmeal porridge. Lean meats, white fish, fowl, game and eggs may be given, but soups and broths must be avoided. Raw and coarse vegetables are interdicted as difficult of digestion. An exclusive milk diet is seldom to be recommended, owing to the distention of the stomach which ensues from the introduction of large quantities of fluid, and at the most eight ounces should be taken at a meal. Tea and coffee rarely agree, nor does the ordinary sweetened cocoa. A decoction of cocoa husks or cocoa nibs forms a palatable drink. Not infrequently colitis complicates gastric displacements, and in this event the diet should consist entirely of finely minced fish, poultry, sweetbreads and sheep's brains, dry toast, meat juice, clear soup without vegetables, potatoes and plain milk puddings. Red meats should usually be avoided.

NERVOUS AFFECTIONS OF THE STOMACH

Of the nervous affections of the stomach, which are numerous and often associated with gastric disease, functional or organic, only a few call for especial dietetic treatment.

Nervous Anorexia.—Nervous anorexia, distinguished by diminution or loss of appetite, with absence of sensation of hunger and with even aversion against food, occurs as an associated symptom in most of the organic as well as the functional disorders of the stomach. It also appears as a primary affection.

DIET IN ANOREXIA.—In treating this condition the patient should have it impressed upon his mind that he must not be fastidious, but should eat everything put before him. Frequent small meals with kumiss, matzoon, bacillac, lactone, buttermilk, buttermilk and cream should be given to improve nutrition. Raw eggs are likewise of service. The sour milk products should also be of value, as in this nervous affection auto-intoxication is a characteristic feature.

In cases of hyperesthesia of the stomach, fluid diet should first of all be given in somewhat restricted quantities in form of milk and lime water, somatose, broths, chicken soup, white of egg, whole raw eggs beaten in water, calf's foot jelly, scraped meat, zwieback softened in milk, butter. Gradually solid food is added.

DIET IN PERISTALTIC UNREST.—Peristaltic restlessness of the stomach, if a pure gastric neurosis, calls for hydrotherapy, suitable diet and change of scene. In the regulation of the diet, all irritating foods and

drinks should be prohibited, and the permitted food should be moderate in quantity.

DIET IN CARDIOSPASM.—The treatment of cardiospasm is primarily prophylactic. If the inner surface of the esophagus is very irritable, and the spasm occurs after eating or drinking, mastication must be thoroughly performed and fluids of medium temperature should be taken. When the spasm is accompanied by pain, it is probable that secondary erosions of the mucous membrane exist in the vicinity of the cardia. Fenwick advises in such cases a milk or pultaceous diet for a few weeks, while in severe instances recourse should be had to rectal alimentation.

Habitual Regurgitation.—In the treatment of this acquired and not hereditary complaint, in every case the patient should be made to eat slowly, to masticate thoroughly and to avoid any form of pressure upon the abdomen. As with rumination, which is an hereditary affection, relief is frequently experienced by swallowing small pieces of ice after meals.

SPECIAL CURES IN THE TREATMENT OF DISEASES OF THE STOMACH

Among the special forms of treatment advocated in stomach disorders we may mention the *rest cure*, the *milk cure*, the *grape cure*, and *forced feeding* or *gavage*. (See "Special Diets and Diet Cures," Volume III, Chapter XXVI.)

The *rest cure*, introduced by Weir Mitchell and elaborated by Burkhart of Germany for the treatment of gastric affections, has had a great vogue and is in some instances and in certain cases attended with a great deal of success. It is especially indicated in the treatment of neurasthenia associated with severe anorexia and emaciation. It may be also recommended in the treatment of ulcer, gastritis, atony and gastropotosis.

To be effectively carried out, the treatment should continue for from six to eight weeks. The patient should be kept in bed and given a varied diet at intervals of two to three hours.

DIET LIST FOR THE REST TREATMENT (Boas)

- 7 A.M. $\frac{1}{4}$ liter vigor chocolate in cream; 3 to 4 zwieback (2 rolls); 20 to 30 grams butter.
- 10.30 A.M. Cold or warm meat; eggs; egg foods; wheat bread (perhaps Graham bread); 20 grams butter; 150 grams cream; preserves or stewed fruit.
- 11 A.M. $\frac{1}{4}$ liter of soup; potatoes or other vegetables in purée form; meat and fish; salad; stewed fruit (sweet) or raw fruit; cider, grape juice, or lemon albumin.

- 4.30 P.M. Coffee or tea with cream (150 grams); zwieback, crackers, Graham bread; butter (20 grams) or honey.
- 8 P.M. Eggs or egg foods; wheat bread, Graham bread; butter, 20 grams; stewed fruit; 2 glasses of fruit wine or 1 bottle of malt beer.
- 9.30 P.M. 200 grams cream with 2 or 3 crackers, or zwieback with butter.

In case of constipation, milk sugar, honey, marmalade, buttermilk, sour milk, kefir or yoghoort may be added to the dietary.

The underlying principle of the *milk cure* consists in the ingestion of milk in large quantities, either by itself or in conjunction with other foods. Milk is especially valuable in several forms of stomach disorder, as in ulcer of the stomach and in certain forms of chronic gastritis, but is generally not well borne when the acid in the stomach is deficient or entirely lacking. It is likewise not advisable to give milk in severe cases of atony and of dilatation, and in intestinal conditions accompanied by chronic diarrhea and extreme flatulence.

Milk is apt to cause constipation, and for this reason when given can be rendered more easy of digestion by the addition of barley water, lime water, or magnesia. According to Ruhräh, small quantities of coffee, tea or whiskey may be added to it. When milk disagrees, cream, buttermilk, kefir, kumiss or matzoon may be given as a substitute.

Forced feeding was introduced by Debove and consists, as its name denotes, in forcing milk, eggs and meat extracts into the stomach by means of the stomach tube. It is valuable in the treatment of nervous anorexia, in which cases unless resort is had to this method starvation may ensue.

The *grape cure* consists of a diet wholly composed of grapes. It is of especial value in the treatment of plethoric individuals, in which it is important to reduce weight, in chlorotic girls suffering from dyspepsia and in certain cases of nervous dyspepsia.

Vagotonia.—In connection with affections of the stomach there is a condition to which the name of *vagotonia* has been applied and which has been described at considerable length by Drs. Hans Eppinger and Leo Hess of Vienna (12). From the mass of nervous diseases which have hitherto been grouped under the names of neurasthenia, hysteria and nervousness, a symptom-complex, a clinical picture has been singled out and designated by them as "vagotonia." They regard it as a functional automatic systemic disease, for the reason that all its symptoms may be identified with those of a state of stimulation of the extended vagus. As the basis of this there must exist a vagotonic disposition in the patient, that is, an abnormal irritability of all or only a few autonomic nerves, which under the influence of some adequate stimulus, a stimulus which may be less than

that which would affect a normal autonomic system, may lead to the development of the symptom-complex, vagotonia.

If all the symptoms are considered which belong to one disease, as, for example, nervous dyspepsia, gastric ulcer, cardiac neuroses, or exophthalmic goiter, one is struck by the fact that *all the symptoms* of the disease never appear in a single case, but apparently for no reason one particular symptom always predominates. It can be shown by means of well-known diseases, that the common bond between the apparently unrelated symptoms is the predisposition to vagotonia, which is responsible for the ready activity and increased tone of the autonomic nerves. The disease itself as an etiological factor is to be contrasted with the constitutional predisposition, in this particular instance the predisposition to vagotonia, which implies an exceptionally ready irritability in the autonomic nervous system. On this account vagotonic individuals will in the course of a disease, react to the poisons of the disease with different symptoms to those exhibited by non-vagotonic individuals.

On the one hand, the vagotonic constitution may be the basis of a neurosis which may be separated from the group of neurasthenias, while, on the other hand, it may modify in a definite way the course of various organic diseases. As a matter of fact, many symptoms may be referred to autonomic stimulation, and it is the regular relationship of certain symptoms (such as asthmatic attacks and eosinophilia) which may be interpreted in the light of the conception of vagotonia.

ABNORMALITIES OF VAGOTONIC PERSONS.—The picture of vagotonia is principally seen in youthful or in middle-aged individuals. Both men and women consult the physician for some seemingly trivial symptom, stomach or intestinal trouble, fear of heart failure, or some "neurasthenic" ailment and are treated as ambulatory patients. The appearance of such patients is that of "nervous invalids." Their movements are hasty and hurried. The color of their faces is often very changeable, now flushed, now fading into paleness. A similar thing may be seen when the patient is asked to undress. When this is done, blotchy areas of redness, which seem to be of a considerable hardness, may appear on the skin of the trunk or arms. The hands of these patients are bluish-red, markedly cyanotic, turning pale when stroked by the finger, damp and cool. The palms have a thick skin, even though the patient may not have done any hard work. These patients complain that they perspire readily, even over the entire body. In some there are places of predilection for the sweating which are quite characteristic—on the back, head, face, feet; and often during the examination of this class of patients, the sweat rolls from the axilla down

the thorax. Under the influence of anxiety or excitement, the face rapidly becomes moist, and drops of sweat appear on the forehead or nose after mild excitement. Sometimes one can recognize a vagotonic as soon as he enters a room. Large brilliant eyes, which seem particularly large owing to the widening of the palpebral fissures, give the face an appearance suggestive of exophthalmic goiter. Usually these persons are poorly nourished and undergrown, their thick lips, plump nose and enlarged cervical lymph glands suggesting that they may have had scrofula in childhood. Often the anamnesis justifies this impression.

ABNORMALITIES OF THE GASTRO-INTESTINAL TRACT—Among the abnormalities which characterize the vagotonic disposition are those of the gastro-intestinal tract. The vagotonic declares that large pieces of food stick at the back of the heart after swallowing. Soon after beginning a meal, feelings of fullness and distention distress the patient, though his appetite is not yet appeased. Sometimes the abdomen is seen to swell in the gastric region under the left costal margin. Relief is obtained by belching, which is brought about by taking some bicarbonate of soda. Others complain of acid retching, which may even attain the severity of heart-burn. The appetite is variable, though generally very good. The activity of the bowel is sluggish, yet now and then there are periods of unaccountable diarrhea to which the patient pays little attention, since in his experience these attacks often bring considerable relief. The stools are few in number, and seldom bulky.

These people realize that a diet consisting largely of vegetables and other foods rich in residue relieves their costiveness and other troubles. A diet almost exclusively made up of carbohydrates is very poorly borne, for precisely such a diet gives the sensation of pressure in the stomach. The abdomen, as a whole, shows little that is at all characteristic. The sigmoid filled with feces, but rarely thick, frequently may be felt. Coils of intestine, tightly stretched out, or filled by pseudo-fecal tumors, are rarely demonstrable in these individuals. Splashing in the region of the stomach directly after eating or after drinking a great deal of fluid is also very infrequent.

Vagotonics pass their urine in small amounts and at frequent intervals. It is, as a rule, brightly colored and may precipitate a "sedimentum lateritium" in cold weather. These urinary conditions are usually associated with urinary hyperacidity. This seems all the more probable since it is just in those cases in which hyperacidity is present that these conditions are found. The stomach is much contracted. Frequently a striking hyperacidity exists. Findings of 70-100 Riegel units after a test meal

of three pieces of zwieback and 300 c.c. of water, removal in 40 to 45 minutes, are not at all unusual. The stool estimated by its condition in any twenty-four hours is scanty and poor in water and often has the form seen in spastic constipation.

With regard to vagotonic diseases of the stomach, the author holds that stimuli may act upon the autonomic supply to the smooth muscle and secretory apparatus of the stomach and may produce pathological states of the same nature as are found when the autonomic system is in a state of increased irritability. The severity of the subjective symptoms is frequently the only deciding point, since it has been found that the objective signs in the stomach are the same whether the patients complain of them or whether they are discovered during clinical examination for the purpose of demonstrating vagotonic manifestations.

Frequently the pathological condition gradually modifying itself into a pure vagotonia will be found. This applies particularly to motor neuroses. In a series of cases showing signs of vagotonia outside of the domain of the stomach, and in which patients complained of pressure in the region of the stomach, rumblings in the stomach or cutting pains after eating, the X-ray examination will show that the peristaltic action of the stomach is much increased. The stomach was often observed to fill slowly; as soon as the bismuth appeared at the fundus, a strong wave of peristalsis apparently cut the bismuth into two parts. Not infrequently the stomach is separated into three ball-like partitions. Sometimes the stomach empties promptly without there being any lengthening of the usual time. In other cases antiperistaltic movements appear before the stomach empties itself. This points to a spastic condition of the pylorus, particularly since there was, as a rule, no evidence of motor insufficiency. These conditions are sometimes so plain that they may be seen on the surface of the abdomen. But since they are generally associated with an increase in the tone of the gastric musculature, they are not always observable on simple inspection of the surface of the abdomen. In these last mentioned cases, however, a valuable point of differential diagnosis from the increased peristalsis, due to mechanical obstruction, is found.

SPASTIC CONSTIPATION.—Spastic constipation is a frequent finding in vagotonic individuals. As atropin has a very favorable effect upon this condition, and, furthermore, as spastic states in the circular colonic musculature and in the rectal sphincter are known to play a part, this disease may be attributed to autonomic irritation.

Summary of Vagotonia.—The authors(12) thus sum up their views on vagotonia, viz.:

1. Vagotonia is a functional increase of tone in the autonomic system.
2. This increase may affect nearly all or but few of the branches.
3. The origin lies in a latent increase of function and this permits stimuli to act more readily than on a nervous system in which no such increase exists.
4. Vagotonics, therefore, are more responsive than individuals having a normal vegetative system.

The real etiology of vagotonia must be sought in some disturbance of the internal secretions. Not only has an insufficiency of the chromaffin system been proved to exist in certain types of endocrinopathic individuals, but it has also been shown that these same individuals have a lymphatic system which is more strongly developed than normally.

DIET IN VAGOTONIA.—The diet of persons having a vagotonic disposition should consist largely of vegetables and other foods rich in residue, otherwise they are liable to suffer from constipation. Symptoms such as hyperacidity must be dietetically treated. In a general way, it may be said that individuals of the vagotonic temperament should live well, but should avoid excess. Particularly should they be careful not to indulge too freely in alcoholic beverages.

REFERENCES

1. HAWKINS, DR. HERBERT. Sutherland's System of Diet and Dietetics.
2. KEMP, ROBERT COLEMAN. Diseases of the Stomach, Intestines and Pancreas, W. B. Saunders. Third Edition.
3. FENWICK. Index of Treatment, Latham and English.
4. STRÜMPPELL. Practice of Medicine.
5. FENWICK. Index of Treatment.
6. KEMP, ROBERT COLEMAN. Diseases of the Stomach, Intestines and Pancreas, W. B. Saunders. Third Edition.
7. BRUNTON, LAUDER. Sutherland's System of Diet and Dietetics.
8. WATSON, CHALMERS. Food and Feeding in Health and Disease, 1911, Wood.
9. KEMP, ROBERT COLEMAN. Diseases of the Stomach, Intestines and Pancreas, W. B. Saunders. Third Edition.
10. HABERSHON, H. S. Practitioner, April, 1906.
11. HARRIS. Medical Treatment of Gastric and Duodenal Ulcers, South. Med. J., May, 1917.
12. EPPINGER and HESS. Vagotonia, a Clinical Study, Nervous and Mental Diseases Publishing Co., New York.

CHAPTER III

DIET IN DISEASES OF THE INTESTINAL TRACT

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Acidosis: Manifestations of Acidosis; Causes of Acidosis; Classification of Acidosis; Acidosis and Diet.

Appendicitis.

Auto-Intoxication: Considerations in Auto-Intoxication; Putrefactive Auto-Intoxication; Etiology of Auto-Intoxication; Term Auto-Intoxication; Protein Poisoning.

Diarrheas: Considerations in Diarrheas; Other Classifications of Diarrheas.

Intestinal Obstruction: Chronic Intestinal Obstruction.

Dysentery: Acute and Chronic Dysentery.

Constipation: Habitual Constipation; Neurasthenic Constipation; Etiology of Constipation.

Colitis: Membranous Colitis; Mucous Colitis; Ulceration of the Colon.

Diet in Other Intestinal Diseases: Hemorrhoids; Intestinal Colic; Nervous and Lienteric Diarrhea; Intestinal Stasis; Intestinal Neurasthenia.

Sprue: Character of Sprue.

ACIDOSIS

Nature of Acidosis.—Acidosis, or acid intoxication, has assumed a considerable degree of importance during recent years, so much so indeed that although the main object of this part of the work is to suggest and prescribe dietetic treatment for various diseases in accordance with the latest views of the highest authorities, yet a certain amount of digression will be made in discussing at some length the nature of acidosis, or rather in stating what is known of a somewhat obscure subject.

Cammidge(1), writing on acidosis, says, "It may be defined as a condition in which there is an accumulation of acid products of metabolism in the body owing to an excessive production or to a defective elimination or to both together. It is now generally agreed that the clinical symptoms of acidosis are not dependent upon any specific toxic properties possessed

by these metabolic products, but that they arise from the impoverishment of the body in bases occurring as a result of their acid character. Considered from the standpoint of a deficiency of bases, the term acidosis may be extended to include conditions in which there is an excessive primary loss of bases, or an inadequate absorption of base-forming substances through the intestinal mucosa to meet the ordinary requirements of the body.

"The possible causes of an absolute or relative acidosis are consequently numerous and a more or less varied degree is met with in a large variety of conditions including diabetes mellitus, starvation, cyclic and hysterical vomiting, psychosis, cancer, pregnancy, retention of the placenta or fetus, uremia, fevers, infantile marasmus, various gastro-intestinal disorders, Asiatic cholera, poisoning with various drugs such as the heavy metals, atropin, morphin, antipyrin, phlorizin, and after chloroform and ether anesthesia, etc. In some disorders the acidosis is of a slight and transitory character, constituting a relatively insignificant feature of the clinical picture, but in others it assumes the dominant rôle and is often the determining factor in a fatal issue of the disease. The latter is the case with diabetes mellitus, particularly when unsuitable methods of treatment have been followed."

Manifestations of Acidosis.—Acidosis is believed to occur in a variety of different circumstances, and is at the root of several clinical groups of symptoms, characterized, as a rule, by air hunger without cyanosis and often accompanied by coma. Diabetic coma is the principal example; other clinical manifestations of acidosis are some forms of the cyclic vomiting of children and allied conditions, delayed chloroform poisoning and possibly some forms of infantile atrophy. Our knowledge is still far from complete. When the condition was first recognized, it was regarded as consisting in a diminution of the normal alkalinity of the tissue juices, from the presence of fatty acids and their derivatives which are ultimately excreted in the urine as acetone, diacetic acid and oxybutyric acid. Spriggs(2) points out that if the amount of acid ingested or produced in the body is so great that it cannot be neutralized, or disposed of by oxidation, then the reaction of the tissue fluids can no longer remain unaltered and there is danger of the onset of the symptoms of acid intoxication.

Acidosis, then, according to the above mentioned authority, "is characterized by the excretion in the urine of an excess of acid radicles. These may or may not be thus normally present. In the forms of acidosis most commonly met with in disease, organic acids are found which are

foreign to healthy urine. A rise in the acidity of the urine is not a necessary consequence of an excess of acid radicles; indeed, if the mechanism provided for the neutralization of acid were complete, the reaction of the urine would be unaffected, as all acids would be passed out as salts or esters. It commonly happens, however, that the alkali provided by the body is insufficient for complete neutralization, with the result that the acidity of the urine is raised.

"Excess of acid may be produced in the body long before any appreciable reduction in the alkalinity of the blood is found. In other words, acidosis may exist for a great length of time without passing into acid intoxication. The reservation of the term acid intoxication for the latest stage of all, in which severe and commonly fatal symptoms arise is not satisfactory, for clinically there is no dividing line between the two conditions; it is clear that as soon as the alkaline reaction of the blood is constantly lowered, the mechanism for the neutralization and excretion of an excess of acid has begun to fail, though unequivocal symptoms of intoxication may not have appeared."

Causes of Acidosis.—The latest published views tend to show that acidosis may also be due to non-fatty acids, lactic acid and perhaps the mineral acids, and that an acidosis from this cause is the basis of uremic dyspnea and the dyspneic coma of pernicious anemia. Sellards and Cammidge consider that the essential feature of acidosis is a general impoverishment of the body in bases or in substance, which generally give rise to bases, *e.g.*, sodium bicarbonate. The impoverishment in bases may be brought about by the loss of bases as such, as in the so-called relative acidosis, or by the neutralization of acids as in the so-called absolute acidosis. Acetone occurs in the urine in the less severe cases of acidosis, in which the oxidation of oxybutyric and diacetic acids is complete. Its characteristic sweet odor in the breath is often a means of diagnosis of diabetes and other forms of acidosis or acid intoxication.

Spriggs, an English authority, in the *Quarterly Journal of Medicine*, points out that the acetone bodies are found in the urine in a large number of clinical conditions, principally diabetes, gastro-intestinal and liver diseases, fevers, in many other diseases associated with progressive inanition, and after anesthesia. In these, with the exception of diabetes, there is some degree of starvation involving the absence of carbohydrate foods. In diabetes there is more or less inability to make use of carbohydrates. The result in each case is that the individual is forced to supply his energy needs from protein and fat. In looking for the source of the acetone bodies attention has therefore been directed to these foodstuffs.

It is known that in starvation from any cause, great demands are made upon the fat stores of the body. In the first six days of fasting in man it has been found that four-fifths of the total energy expended is furnished by the body fat. In this condition the liver becomes loaded with fat, which apparently undergoes some transformation in that organ before being oxidized. If then fat is the source of the acetone bodies, an addition of fat to the diet of a person having acetonuria should favor the excretion of acetone; this has, in practice, been found to be the case, especially if the lower fatty acids, such as butyric, are added. The provision of energy in another form, such as that of protein, which would spare fat, is followed by a definite lessening of the acetonuria. The amount of acetone bodies which may be passed out both in adults and children existing on fat and protein is considerable.

The ingestion of carbohydrate is followed by a rapid diminution in the excretion of acetone bodies, unless, as in severe diabetes, it cannot be utilized. One hundred to one hundred and fifty grams, and in some cases even fifty to sixty grams, are sufficient to abolish acetonuria in a few days in individuals who are starving or subsisting entirely on protein and fat. Langdon Brown has pointed out that normally carbohydrates are absorbed by the blood as dextrose and that of all the foodstuffs they appear to be the best utilized in rectal alimentation. That dextrose is definitely absorbed from the bowel, is proved by the following facts: Reach found that the respiratory quotient was raised by rectal feeding with dextrose, a sure sign that it was being utilized by the tissues, and the acidosis of delayed chloroform poisoning or of inanition in esophageal stricture has been reduced or abolished by this procedure. Now just as nothing induces acidosis so quickly as deprivation of carbohydrates, so nothing abolishes it so rapidly as their assimilation.

The conclusion at once presents itself, that the carbohydrate spares fat, and by lessening the amount used reduces the strain upon the oxidizing powers of the body for fat. Spriggs says that this is no doubt true, so far as it goes, but it is perhaps not the whole truth. For the quantity of carbohydrate sufficient to abolish oxybutyric acid and diacetic acid and acetone from the urine does not furnish so much energy as is being provided by fat in such cases. Spriggs, therefore, suggests that carbohydrate food has some other function in aiding the oxidation of fat, as, for example, to supply an easily assimilable nutriment to the liver cells, which are overworked by the increased fat metabolism.

In total starvation and in protein starvation such as upon a diet of starch and cream, the percentage of the total nitrogen passed out as

ammonia is much raised. In such a condition the protein needs of the body are met by a disintegration of its own tissue, the minimum necessary for the performance of the bodily functions being used. In these circumstances the amount of urea formed is comparatively small, and instead of forming 80 to 90 per cent of the total nitrogenous excretion it is only 50 to 60 per cent. There is, therefore, a corresponding relative increase in the proportion of the total nitrogen appearing in other forms, as creatinin and ammonia, though the absolute amount of these bodies is but little affected. We see, then, that a rise in the percentage of the total nitrogen excreted in the form of ammonia may be due simply to a decrease in the amount of urea passed out in a condition of protein starvation. The importance of appreciating this will be seen, for in the literature of acidosis, acid poisoning is often assumed to be present because the proportion of the total nitrogen excreted as ammonia is raised to ten or fifteen per cent, whereas on considering the total figure for nitrogen it appears that it is below six or seven grams. Therefore, a high proportion of ammonia is to be expected quite apart from the presence of organic acids.

Classification of Acidosis.—From a clinical point of view cases may be grouped as follows:

1. Symptomatic acidosis.
2. Acid intoxication from drugs.
3. Diabetic acidosis.
4. Cyclic vomiting.
5. Delayed chloroform poisoning.
6. Acidosis in infancy.
7. Cardio-renal or uremic acidosis.
8. The acidosis of anemia.

Symptomatic acidosis, acetonuria accompanied by the odor of acetone in the breath, but not associated with any other symptoms which at present can be referred to acidosis, occurs in a great variety of conditions. It is met with in sepsis, acute pneumonia, fevers of all kinds, appendicitis, peritonitis, gastric ulcer, diphtheria, toxic gastro-intestinal disorders, starvation, and in indigestion, especially in children. In these cases a definite oxidization of carbohydrates is responsible. Cyclic vomiting often occurs in children who suffer from chronic indigestion and are particularly intolerant of carbohydrates. Intestinal putrefaction is quite frequently associated with acidosis. In acidosis in infants suffering from gastro-intestinal disorder the urine contains a relatively large amount of ammonia nitrogen. Keller associates this fact with an excess of fat in

the diet. As is known, increase in the output of ammonia nitrogen is, at any rate to a limited extent, a measure of acidosis. The excess of fat may lead to an increased absorption of fatty acids from the intestine, constituting "absolute acidosis," or it may operate in another direction. According to Keller, the fatty acids in the intestine are neutralized by the fixed bases of the tissues, which are found in the stools. The body is therefore deprived of its alkali and "relative acidosis" results.

Lewis and Sellards have both suggested that cardio-renal dyspnea may be due to a renal defect altering the relative elimination of acids and bases. Sellards' work goes to show that acidosis is constantly present in all types of uremia, whether associated with dyspnea or not.

The dyspnea of exercise is due to acidosis from excess of lactic acids, and apparently the dyspnea felt at high altitudes is also due to acidosis. In pernicious anemia also it is possible that acidosis is present. It may be emphasized that in the case of children, deprivation of food results in a condition of acidosis with surprising rapidity. A considerable proportion of patients prepared for operation are the subjects of acetoneuria, and in these, especially among children, postoperative vomiting is more marked. The results of treatment, moreover, as shown by Wallace and Gillespie in cases of postanesthetic poisoning or delayed chloroform poisoning, support the view that acidosis is an important factor. Several writers have suggested the administration of carbohydrate in postanesthetic poisoning, both as a prophylactic and as a method of treatment. Scurvy is a disease which has been attributed to acid poisoning.

Acidosis and Diet.—Acidosis, then, is believed by many to be the result of faulty metabolism associated with the diet. Weight is given to this view because the symptoms are largely concerned with disturbances of the gastro-intestinal tract. The question of the dietetic treatment of periodic vomiting of children, preventive and curative, is extremely difficult, owing to our comparative ignorance of the pathology of the affection. So many views have been brought forward that they are confusing. This seems to be definitely known, that as deficiency or deprivation of carbohydrates will bring about acidosis, so feeding with carbohydrates will rapidly abolish it. The acidosis of diabetes can be checked to some extent by giving carbohydrates. The late Dr. Eustace Smith, however, believed that many cases of periodic vomiting are due to excess of carbohydrates and the accompanying intestinal fermentation. Dr. L. Emmett Holt also advises that in the intervals between the attacks, all sugars and sweets should be excluded from the diet, and that the amount of starchy food should be carefully limited.

Thus, as Sutherland points out, the condition of acidosis has been ascribed by different writers to (*a*) an excess of proteins, (*b*) an excess of carbohydrates and (*c*) an excess of fats in the diet. It must be borne in mind, however, that such excess is not an absolute one, but only relative to the power of the individual to deal with these substances.

The question of cyclic vomiting in childhood rightly comes under the head of diet in diseases of children, but as it is an important phase of acidosis, or, at any rate, generally presumed to be, it will be briefly discussed in the following paragraphs.

OVERFEEDING.—Pritchard(3) says that viewing the question in the very widest manner and remembering the conservative character of the processes of the animal body, it may be regarded as improbable that such loss of energy as is involved in the passage of semi-oxidized products from the body would be tolerated unless the supply of energy exceeded the physiological needs. He, therefore, regards overfeeding, that is to say, relative overfeeding, as the key not only to the problem of acidosis, but also to many of the common conditions of malnutrition which affect children.

If more food is consumed by the child than is required for the immediate purpose of heat production, the display of energy and the maintenance and growth of the tissues, the excess will be dealt with in a manner causing the least possible inconvenience to the body as a whole, and will be got rid of by means of some protective mechanism with which the system is equipped.

Infantile Acidosis.—The common clinical picture of infantile acidosis is that of rickets with occasional severe crises taking the form of convulsions or often severe nerve strains, such as attacks of cyanotic hyperemia. In older children, the attacks take the form of cyclic vomiting, recurrent bilious attacks, sick headaches or migraine. When Pritchard accused overfeeding as the chief factor in acidosis production in children, he was, of course, well aware of the notorious fact that starvation invariably leads to the appearance of acetone bodies in the urine.

However, by excess is meant "relative excess" and not excess as measured by the usual standards. Each child creates a different physiological demand for food in accordance with his general habits of life; exercise; the temperature condition of his environment; his clothing; the climatic conditions, and a thousand other varying factors in his surroundings. It follows that a diet which is perfectly physiological under certain conditions may become excessive and pathological under others, and vice versa. Pritchard insists that in the prevention of acidosis in children, the

treatment may be summed up in one word, namely, "diet," and the essential factor is the avoidance of excess, either in respect to the total amount or any of its component elements.

The difficulty of controlling the amount is much more apparent after the bottle stage when the quantity can be accurately measured. After the first years of life, the child acquires some power of independent locomotion, and hence creates physiological demands for food which mitigate the dangers of overfeeding. Knowing how difficult or impossible it is for the physician to control the dietary of the pampered child and to keep it within the bounds of physiological safety, he strongly advises all those whose duty it may be to regulate the dietary of such patients, to concentrate their energies on two points, first, in keeping the diet simple rather than appetizing; second, in creating demands for food rather than in attempting to curtail the supply. A physiological demand is made by providing opportunities for exercise in the open air; by instituting breathing exercises; by enjoining the wearing of light clothes; by keeping the nursery cool; by insisting on the open window, and, if necessary, by ordering massage and Swedish exercises. A certain amount of good can be done by limiting the meals to three per day; by forbidding all extras between meals, such as cod liver oil or meat, so dearly beloved by anxious parents.

DIET FOR CHILD OF TWO YEARS.—Pritchard recommends the following diet for a child two years of age: for breakfast, eight ounces of milk, two thick pieces of toast or crusty bread, with butter; jam, without seeds, pips or skins; stewed fruit. For dinner, meat, fish, egg, fowl, plenty of well-boiled vegetables, small quantity of potato and always a milk pudding and stewed fruit. For tea, the same as at breakfast. Children thus fed sit down hungry for their meals, but they do not overeat and there is little temptation to do so, consequently they remain well and grow strong. Any child who does not sit down to meals hungry is potentially overfed, badly managed and probably either in a condition of established or incipient acidosis. Pritchard lays emphasis on the point that the adequate balance between fats, carbohydrates and proteins constitutes one of the chief prophylactic resources against the production of metabolic derangements.

Acidosis of Postanesthetic Poisoning.—Langmead(4) describes the acidosis of delayed postanesthetic poisoning and points out that the toxic symptoms do not follow chloroform anesthesia alone, but may occur after the use of ether, ethyl chlorid, or even after nitrous oxid gas, as in a case recorded by the writer. Robert Coleman Kemp(5) reports a case of

postoperative ether acidosis with active renal hemorrhage, and another of acidosis with intestinal putrefaction (marked indicanuria), with angio-neurotic edema of the larynx and ascending colon. The commonest and more serious cases follow chloroform anesthesia.

Intestinal toxemia throws too great a burden upon the liver and the resulting hepatic inadequacy is the cause of both the acidosis of cyclic vomiting and of delayed anesthetic poisoning. Increasing poisons from the bowel continue to task the defensive powers of the liver until its protective mechanism breaks down. A general toxemia then results and constitutes the attack. If during the accumulative phase of the toxins an anesthetic is employed, the attack is precipitated and aggravated.

With regard to treatment of cyclic vomiting, Langmead points out that dietetic measures have little influence in preventing the attacks of true cyclic vomiting, which occur in spite of most rigorous dietetic régimes. It is scarcely necessary to say that the diet should be reviewed in order to correct the usual irregularities of overfeeding and pampering with sweets, bananas, etc., with which "delicate" children are so frequently beguiled. Satisfactory evacuations should be secured by the use of a regular laxative if necessary. Some preparation of paraffin or fresh infusion of senna pods usually suits admirably.

Langmead cautions that in delayed anesthetic poisoning, prophylaxis is of the utmost importance. There should be no protracted period of starvation before operation in the case of children. Before all operations of no urgency, children should be kept under observation for a few days to allow them to compensate for altered diet. During this period, the administration of glucose by the mouth provides an additional safeguard.

Cambridge directs that the diet should be arranged with three main objects in view: (*a*) to limit the production of acid products of metabolism as much as possible; (*b*) to conserve the store of alkaline bases at or near the normal level; (*c*) since the formation of abnormal acid products of metabolism results primarily from a deficient supply, or the defective utilization of carbohydrate, it is obviously advisable that the intake of starchy food should be as liberal as the patient can use. Oatmeal is of particular value.

Cyclic Vomiting.—As a matter of fact, as yet there is no complete unanimity as to the exact influence diet exerts in the causation of cyclic vomiting, so that it would be premature to advance any dogmatic statement with regard to what the diet should be during an attack. Indeed, when the attack is acute, vomiting is so severe and persistent, that appetite is lost and food cannot be retained. Thirst is the chief discomfort

from which the patient suffers and for its relief frequent sips of hot or cold water, soda water or barley water may be given. If, after twenty-four hours the patient is still intolerant of food by the mouth, nutrient enemata composed of peptonized milk (1 oz.), glucose (half an ounce of a 10 per cent solution and $\frac{1}{2}$ dram of brandy may be given every four hours). As soon as food can be retained in the stomach, it seems advisable to avoid all fatty material and to give only digestible proteins and carbohydrates. Peptonized milk may be given at first, with oatmeal gruel or porridge, and later bread, farinaceous puddings and sugar. Soda bicarbonate by enemata $\bar{5}$ iii in 24 hours should be administered in divided doses. Later it may be given by mouth.

It is a somewhat curious matter of clinical experience, that in typical cases of periodic vomiting the attack ceases suddenly and after sleeping the patient wakes up ravenous. Furthermore, the food taken will be retained and digested. Nevertheless, it is well to be careful as to diet for a few days in order that assistance may be given to the elimination of the acids from the system.

Sutherland, after trying both protein and carbohydrate diets with little or no success so far as curative effects were concerned, concluded that it might not be amiss to give a trial to the Weir Mitchell system of over-feeding, massage, rest and isolation. The following was the diet taken during a period of six weeks:

DIETARY FOR CYCLIC VOMITING (Sutherland)

- 5 A.M. Cocoa and milk ad lib.; bread and dripping.
- 7 A.M. Cream, $\frac{1}{2}$ oz.; milk, 3 oz.; water, 1 oz.
- 9 A.M. Milk, 5 oz.; malt extract, $\frac{1}{2}$ dram; water, 2 oz.; bread and dripping.
- 11 A.M. Cream, $\frac{1}{2}$ oz.; milk, 3 oz.; water, 1 oz.
- 1 P.M. Meat; pudding with cream, 1 oz.; bread and dripping.
- 3 P.M. Milk, 5 oz.; milk extract, $\frac{1}{2}$ dram; water, 2 oz.
- 5 P.M. Cocoa and milk; one egg; bread and dripping.
- 7 P.M. Cream, $\frac{1}{2}$ oz.; milk, 4 oz.; water, 1 oz.
- 9 P.M. Raw meat juice, 1 oz.; water, 1 oz.; bread and jam.
- 1 A.M. Raw meat juice, 1 oz.; water, 1 oz.

During this treatment the patient increased in weight from 43 $\frac{1}{2}$ lbs. to 56 lbs. There were no attacks of vomiting and she looked the picture of health. The patient was not cured, for on her return home the vomiting returned and wasting set in rapidly.

Referring again to cyclic vomiting, it may be said that Charles Gilmore Kerley(6) is of the opinion that cases of periodic vomiting are due

to defective oxidation, and this is mainly owing to failure of the liver. He includes children subject to such manifestations under the class which he terms that of "the rheumatic complex." This symptom complex is characterized chiefly by great susceptibility to infection of the respiratory mucous membranes and the tonsils, by unbalanced or ill-balanced nervous system, and a liability to spasmodic affections of the respiratory tract, exhibited in bronchial spasm and catarrhal laryngitis. Such children are of a remarkably nervous temperament, so much so that in play they lack control, excite themselves and waste much time over trifles. They possess little or no powers of concentration, suffer from growing pains and are peculiarly subject to periodic and intestinal crises, as cyclic vomiting. Kerley draws attention to the fact that like begets like, and that this type of child inherits its constitutional and temperamental defects, or is the offspring of those who suffer from so-called rheumatism, lithemia, gout, uric acid diathesis, etc. Kerley, as is the case with all observers, has always noticed that during the attack the breath has the characteristic odor of acetone, but that an examination of the organs and secretions fails to show anything abnormal excepting the presence of acetone, diacetic acid, and oxybutyric acid in the urine, as described by Edsall.

Treatment of Cyclic Vomiting.—With regard to treatment, Kerley points out that in his description of the management of children who exhibit the rheumatic complex the influence of the intense carbohydrates and fats was referred. As he believes that cyclic vomiting is one of the manifestations of the rheumatic complex, it logically follows that in the interval management of such cases he advises that these substances are withheld from the diet.

It is further pointed out by Kerley that various authors have commented on the fact that the ingestion of milk in some children will bring about an attack. In the opinion of Kerley it is to the fat content of the milk that this result is due, as children prone to cyclic vomiting can take fat-free milk and buttermilk without unpleasant sequelæ. Children of the rheumatic symptom complex type have but small capacity for fat or sugar, and for cane sugar and cow's milk fat in particular. The most appropriate diet is that most nearly approaching a vegetable and cereal diet. Poultry, fish and egg whites are the only ones of the nitrogenous foods permitted. Vegetables, stewed fruits and skimmed milk puddings may be eaten freely, while skimmed milk or buttermilk may be drunk both at the morning and evening meal. No cereals are contra-indicated. From the above menu there is no trouble in establishing a well-balanced ration.

Kerley holds that children will learn readily to dispense with sugar, and there is little trouble in giving cereals without the addition of sugar. Small amounts of saccharin may be added to stewed fruits and puddings; but Kerley insists that children quickly become accustomed to eating stewed fruits, cereals and puddings with no sweetening agent of any kind. As the fat in the yolk of egg has marked toxic effect on children of the so-called rheumatic type, and especially on those subject to cyclic vomiting, yolk of egg must be interdicted in the making of puddings. In the place of one whole egg, the whites of two eggs are used. Kerley's receipt for a custard appropriate for a child given to periodic vomiting is as follows: White of one egg, saccharin, one-third cup scalded skim milk, 10 drops of vanilla, 10 grains of salt; stir white of egg with silver fork, add milk gradually, salt and flavoring. Strain and bake somewhat longer than for an ordinary custard. Kerley is convinced that unless sugar and free fat are largely withdrawn from the diet, all other remedial measures will be of no avail. Red meat should be eschewed.

According to Kerley, after an acute attack of cyclic vomiting, when the vomiting has ceased and the child is on the high road to recovery, some one of the dried breadstuffs often answers better than does a fluid diet. In a general way, however, a diet of broth, gruel, skimmed milk and dried bread is best for the first few days following an attack. Cammidge points out that in the treatment of acidosis, careful regulation of the diet according to the nature and extent of the metabolic changes shown to be present by analysis is the chief means of combating the condition. Treatment by drugs is at best only palliative.

The diet should be arranged with three main objects in view: 1. To limit the formation of acid products of metabolism as much as possible. 2. To conserve the store of alkaline bases in the tissues and blood. 3. To maintain the balance between these bases at or near the normal level. Since the formation of abnormal acid products of metabolism results primarily from a deficient supply, or the defective utilization of carbohydrate, it is obviously advisable that the intake of starchy food should be as liberal as the patient can use and as is consistent with the satisfactory control of other symptoms. In many cases, the limit of utilization of carbohydrate is so low, however, that one has to rely more on regulating the food supply in other directions, and particularly by limiting the intake of protein. The oxidation of all protein material gives rise to an excess of acid-forming over base-forming elements, so that the more protein used by the organism the larger is the call upon the stored bases to neutralize the excess of acid that results. It is well known

furthermore that a protein diet by virtue of its specific dynamic effect upon the decomposition processes of the body increases metabolism, promotes tissue waste, and consequently augments the formation of acid products. For these reasons alone, if for no others, it is a distinct advantage that the protein intake in diabetes should be limited to an amount which will replace the nitrogenous waste of the body without leaving any appreciable excess. The question of diet in diabetic acidosis will not be entered into further, for, although it falls under the head of acidosis, it is dealt with fully in Volume III, Chapter XII, "Diet in Diseases of Metabolism."

DIET IN ACUTE INTESTINAL OBSTRUCTION.—No food must be given in cases of acute intestinal obstruction until operative measures for its relief have been completed. The mouth may occasionally be washed out with lemon water, but the less swallowed the better. Lavage will check vomiting. Proctoclysis is indicated and relieves the distressing thirst of these patients. The entrance of any fluid into the stomach will inevitably cause vomiting and its passage into the bowel will increase the distention.

APPENDICITIS

Appendicitis—**DIET IN APPENDICITIS.**—Surgical treatment is usually indicated in the treatment of this disease, but the dietetic treatment must be governed by the symptoms. In cases in which a diagnosis has been quickly made, food should be given sparingly. If there is reason to suspect a perforative lesion of the appendix, a dietetic treatment should always proceed on the supposition that either rupture or gangrene is present. The method best calculated to bring about a cure is to have an empty motionless stomach and a stationary intestine. The degree of peristaltic activity greatly influences the dissemination of bacteria through the abdominal cavity. Consequently in pursuance of this plan, food should be prohibited during the first days and proctoclysis employed for thirst.

Ochsner(7) recommends this routine of treatment in all cases in which operation is to be performed, believing that mortality is reduced thereby and that the class of cases in which the mortality is greatest is changed into another class in which the postoperative mortality is very small. Ochsner's plan is as follows:

In every case of acute appendicitis all food by mouth and all cathartics are prohibited. In case the patient suffers from nausea or vomiting, gastric lavage is at once employed. In the milder cases the patient is permitted to rinse the

mouth with cold water and to drink small sips of very hot water at short intervals. In the severer cases, the patient is permitted to rinse the mouth with cold water, but is not permitted to drink either hot or cold water for the first few days, until the acute attack has subsided, when the use of small sips of hot water is begun. If the nausea persists, gastric lavage is repeated once or twice at intervals of two to four hours in order to remove any substance which had regurgitated into the stomach from the small intestine.

The patient is supported by nutrient enemata consisting of an ounce of one of the concentrated predigested liquid foods in the market, dissolved in three ounces of warm normal salt solution, introduced through a catheter which is inserted a distance of two and one-half to three inches. In case this gives rise to pain or irritation or nausea, it is interrupted for twelve to twenty-four hours at a time. In cases in which no water is given by mouth, an enema of eight ounces of normal salt solution is given four to six times a day in addition to the nutrient enemata. In cases operated upon during the acute attack, this treatment is continued for several days after the operation.

After the patient has been free from pain and otherwise practically normal for four days, he is first given from one to four ounces of weak beef tea, preferably prepared from commercial beef extract, every two hours. In a few days one of the commercial predigested foods, dissolved in water, is substituted; still later, equal parts of milk and lime water; then general liquids, then light diet; and finally, after the patient has fully recovered, full diet is given.

Kemp(8), unlike Ochsner, in acute cases, urges an immediate operation. He is not quite so strict as to diet as Ochsner. For two days, during an acute attack, no matter what the type, he allows neither food nor water by the mouth, employing proctoclysis for thirst. This checks peristalsis and places the patient in the best condition for operation should such suddenly become necessary. After two days small quantities of hot water are allowed by the mouth, and if the temperature is 100° F. or over no food by mouth, but nutritive enemata. When the temperature has fallen to 100° F. or below, food is given by the mouth at first in small quantities. The general diet should then be fluid for some days; no gaseous fluid should be given. Milk well diluted with lime water or equal parts barley water, oatmeal water, rice water, gruels, etc., are excellent. Kemp believes that the latter fluids are preferable to milk, because they cause less tympanites. When the symptoms are subsiding, eggs beaten up with milk, bouillon, chicken broth and later soft boiled eggs and toast are added.

Hawkins is of the opinion that if the first forty-eight hours have elapsed without operation and without signs of general peritoneal infection, milk may be given to the amount of perhaps four ounces diluted with soda water (4-1) every two hours for nine doses in the day. When the period of danger of localized suppuration or of a late general infection

of the peritoneum is past, the diet may be increased by the addition of more milk less diluted, of carbohydrates, beef tea and clear soup, and later of eggs, custard and fish.

After an attack is over and no operation has been performed, the question frequently arises what diet will prevent trouble in the future. Whether the undoubted increase of appendicitis of the gangrenous and perforative type can be attributed to diet is a mooted point. There are certain articles of food which tend to irritate the lining of the intestinal tract, and these should be avoided. Also due attention should be paid to the bowels, for constipation is a fruitful cause of appendicitis, especially when it has occurred before. A diet indicated in the treatment of constipation would well serve the purpose.

AUTO-INTOXICATION (Gastro-intestinal Toxemia)

Considerations in Auto-intoxication.—Auto-intoxication, or alimentary toxemia, is a condition which has been recognized only within a comparatively recent period, but which has undoubtedly existed from the earliest times. Hawkins thinks that in order to check the activity of putrefactive organisms in the cecum by means of the acidity of the contents of the small intestine, carbohydrates and vegetables should be taken freely while meat is diminished. According to Urban, sedentary life, combined with over-eating, drinking to excess and general dietetic errors, have produced digestive troubles, constipation and intestinal stasis to an unprecedented extent. A long-continued state of intestinal stasis is apt to bring about a toxemia resulting from the absorption of abnormal food products, to which Combe gave the name of auto-intoxication. Disturbances of the secretory or motor function of the stomach may also be factors.

Intestinal auto-intoxication is held directly and indirectly responsible, by Metchnikoff and Arbuthnot Lane, for a very long list of ailments and diseases. It is responsible for a group of miscellaneous toxemias which include cases of anemia, headaches, neuralgia, neuritis, arteriosclerosis, rheumatism, neurasthenia and so on.

Constipation is frequently present. In all instances intestinal action is irregular and the bowels are seldom thoroughly emptied. Toxic products are produced by the fermentation of carbohydrate foods, mainly CO_2 , and various organic acids. Water and CO_2 form the end products of the decomposition of carbohydrate foods. The abnormal decomposition of proteins brought about by bacterial action gives rise to toxic products of the various nitrogen and sulphur compounds, which, as a rule, belong

to the aromatic series. The urine eliminates the excess of nitrogen and sulphur arising from these putrefactive products as ethereal sulphates.

DIET IN AUTO-INTOXICATION.—It goes without saying that just as an injudicious diet is a most important factor in the causation of auto-intoxication, so diet plays a prominent part in its relief and cure. Combe tabulates the following general indications for dietetic treatment of auto-intoxication:

Nitrogenous foods: 1. Diminish as much as possible the nitrogenous foods from which the intestinal bacteria derive their nourishment. 2. Absolutely prohibit those nitrogenous foods that are favorable media for the development of bacteria and form veritable culture bouillons. 3. Select eggs as being less putrefactive in the intestine.

Fatty foods: 1. Avoid the fats of meat for they increase putrefaction. 2. Give fresh butter in preference to fat, for its action is much less harmful.

Farinaceous foods: I. Introduce into the diet as large a proportion of farinaceous substances as possible. But to obtain a result it is necessary to saturate the intestine with carbohydrates. The word "saturate" is used because it is not sufficient simply to add a few farinaceous substances to the diet. The patient must be filled with farinaceous aliments. He should not be permitted to take his nitrogenous ration, meat or milk, unless it is accompanied by about five times its weight of farinaceous aliments. It is only in this manner that an intestinal anti-putrefactive action will be obtained.

2. In auto-intoxication from acute enteritis, or in the acute recurrences, an exclusive farinaceous diet must be maintained for several days, for it plays the same part in acute enteritis that a liquid diet does in acute catarrh.

3. In auto-intoxication due to chronic and subacute enteritis, the antiputrefactive regimen should be a mixed one; at first, lacto-farinaceous, and later modified by the addition of very small proportions of eggs and meat.

4. In ordinary auto-intoxication, milk mixed with farinaceous articles, the latter predominating, is much better borne than milk alone, owing to the prevention of the large coagulum formed by cow's milk and to the antiputrefactive action of the farinaceous substances, which is joined to that of the milk lactose, lastly to the fact that the lactose is protected against rapid absorption by the farinaceous substances. A still better result will be obtained by using curdled milk or fresh cheese; both of these are readily taken with alimentary pastes, but particularly so with rice and puddings. The only great difficulty is to determine the quantity of milk tolerated by a new case, for this varies with individuals, often in the same individual and according to the stage of the intestinal disorder. It is well to begin with a rather strong proportion, so as to test the patient's tolerance. In case of either gastric or intestinal intolerance, the amount should be diminished until all symptoms have disappeared, which may be ascertained by examination of the stools. In case of casein intolerance, the milk should be replaced by whey; where the intolerance is for fats, buttermilk should be used. Combe is of the opinion that in intestinal auto-intoxication the lacto-farinaceous is the regimen *par excellence*.

Dietary of intestinal intoxication due to enteritis:

This is the regimen of acute and chronic enteritis occurring in infants. In older children and in adults suffering from enteritis, it is the regimen indicated in the febrile stage and in the acute febrile exacerbations. Finally, it is the regimen to employ in enterics attacked by intercurrent febrile diseases:

- 7.30 A.M. Broth.
- 10 A.M. Broth and good spring water.
- 12.30 P.M. Broth.
- 3.30 P.M. Broth and good spring water.
- 7.00 P.M. good water.
- During night: good water.

Combe formulates so many diets for every form of intestinal auto-intoxication that it will be impossible to more than briefly refer to most of them. He recommends farinaceous diets without meat, with meat, lacto-farinaceous diets, with dried vegetables, full diets.

STRICT VEGETARIAN DIET FOR INTESTINAL INTOXICATION

- 7.30 A.M. Farinaceous broths cooked in water; oat cocoa or Baker's cocoa, cooked in water; rolls and fresh butter.
- 8-9 A.M. Rest, lying down.
- 10 A.M. Fully ripe and sound grapes or fruit in season.
- 12.30 P.M. Thick farinaceous soup made with water and fresh butter.
- Choice of { Alimentary pastes made without eggs or rice.
Dried vegetable purées, peas, lentils, beans.
Green vegetable purées.
- Cocoa pudding without milk.
- Rolls; fresh butter; purées of cooked fruit; nothing to drink.
- 1-2 P.M. Rest, lying down without sleeping.
- 3.30 P.M. Fruit in season or cocoa made with water; no solid food.
- 7 P.M. The same as at lunch, only much less should be eaten and nothing drunk.
- 8-9 P.M. Rest, lying down without sleeping.
- 10 P.M. Café au lait.

The dietetic treatment of intestinal auto-intoxication is of the very first importance, and the rules laid down by Chalmers Watson are in accord with the views of clinicians who have studied the question. He divides the cases broadly into fermentation cases and putrefactive cases and advises that the fermentation cases should be treated with a diet chiefly protein in composition. He restricts farinaceous foods to dry toast, stale bread and rusks. The food should be taken at regular intervals and no food eaten between meals. The free use of plain water or other diluent should be encouraged.

The following dietary is appropriate to cases of auto-intoxication resulting from the abnormal fermentation of carbohydrate foods:

116 DIET IN DISEASES OF THE INTESTINAL TRACT

DIETARY FOR INTESTINAL TOXEMIA DUE TO CARBOHYDRATE FERMENTATION

- 7 A.M. Tumblerful of hot water.
- 8 A.M. Tea, 1 cup without sugar, milk not cream; good helping of fried bacon or fish or eggs or cold ham, or cold tongue or grilled kidney; 1 slice of thin crisp toast, with very little butter.
- 11 A.M. 1 tumblerful of soured milk, with plain sweet biscuit.
- 1 P.M. (a) Fish, or chicken, or game; or chop, steak, or roast beef or roast mutton.
(b) Biscuits or dry roll with cheese and with butter; cup of coffee.
- 4.30 P.M. Cup of soured milk, and half slice sponge cake or biscuit.
- 7 P.M. Clear soup unthickened; meat as at dinner, without vegetables; dry toast and a simple gravy; pudding in form of custard, curds, jelly, cream, or stewed fruit without added sugar; no coffee.
- 10 P.M. Drink of hot water.

Putrefactive Auto-intoxication.—Constipation, although a frequent accompaniment of auto-intoxication, is by no means constant. Indeed, many of the worst cases of the putrefactive variety are marked by diarrhea. The diarrhea, as a rule, is not persistent, but occurs at irregular intervals. However, while a condition of diarrhea may exist in auto-intoxication, the fact remains that the bowels are not thoroughly emptied.

DIET IN PUTREFACTIVE AUTO-INTOXICATION.—In the successful treatment of the putrefactive variety of auto-intoxication, diet is the essential factor. Chalmers Watson, in his work, "Diet and Disease," advises that the putrefactive cases should be treated with a lacto-vegetarian diet. Meat and the red meats in particular should be excluded from the dietary, at any rate, until the condition is relieved or cured. Meat soups should be forbidden, and eggs are not suitable. Our experience leads us to assert that the diet in cases of putrefactive auto-intoxication should comprise bread and milk, farinaceous foods, green vegetables and fruits.

The following is an appropriate diet table, framed by Watson, on these lines:

SUITABLE DIETARY IN PUTREFACTIVE INTESTINAL TOXEMIA

- 7.30 A.M. Tumblerful of hot water.
- 8 A.M. Cereal, porridge, hominy, Quaker Oats with cream; toast or roll with butter, and a little marmalade if desired; 1 cup of tea.
- 11 A.M. 1 glass soured milk with biscuit.
- 1 P.M. Egg in some form, or vegetable savory, as cauliflower au gratin; macaroni cheese, tomato savory; plain milk pudding with cream.
- 4 P.M. 1 cup of soured milk, with piece of sponge cake.
- 7 P.M. Vegetable or milk stock soup; tomato, artichoke, potato, lentil, or onion; fish occasionally, or egg in some form if not taken at midday, or vegetable savory; simple pudding or stewed fruit; no savories and no coffee.
- 10 P.M. Tumblerful of hot water.

Etiology of Auto-intoxication.—Wegele states that the etiology of auto-intoxication is excessive consumption of meat, insufficient mastication, improper gastric digestion, acute stasis in the cecum or colon, as a result of kinking of the flexure (enteroptosis; spastic conditions of the colon; diseased intestinal mucosa, parasites, insufficiency of the liver, infectious diseases, hepatic cirrhosis).

Symptoms may point directly to the gastro-intestinal tract or chiefly to the nervous system. In the first group, we find pyalism, attacks of vomiting, hepatic congestion, slight jaundice and an extremely offensive odor of the feces.

To the second group belong migraines, eclampsia, particularly in children, nervous asthma, angio-neurotic edema and skin eruptions, circulatory disturbances (palpitation, arrhythmia, angina pectoris) and anemia. The urine most frequently shows indican in excess and indolacetic acid. With regard to treatment, Wegele is of the opinion that therapeutics must meet two indications: first, diminish the putrefaction; second, try to strengthen the protective elements of the system.

To accomplish the first object, a diet that does not produce putrefaction must be relied on, and the one that answers best is the lacto-carbohydrate diet. Wegele thinks that at the beginning it is advisable to replace milk with kumiss, kephir or yoghurt. Of the starchy foods only the cereals, like barley, rice and thin flours, should be used. Food rich in albumin should be withdrawn, at least, for one week. Later on, fresh soft boiled eggs, and finally small quantities of white meats may be allowed. Meats rich in nuclein, like liver, kidney, brain, sweetbreads, and those that tend to decomposition as fish and dark meats should be prohibited. If there is no symptom of enteritis, vegetable purée or cooked fruit in purée form may be allowed.

In chronic auto-intoxication the daily use of either kephir, kumiss or yoghurt is recommended. As little meat as possible is given, with the avoidance of the above mentioned meats. Once or twice a week meats should be avoided entirely, and be replaced by fresh soft boiled eggs and additional carbohydrates.

Tibbles doubts that animal proteins are more prone to bacterial decomposition than vegetable proteins. He points out that they are both composed of amino acids, frequently of the same kind, although the proportions are different. Furthermore, it has never been shown that animal proteins behave in the body differently from vegetable proteins. Intestinal putrefaction, in fact, is directly proportional to the amount of proteins in the food. It is true, however, that more indol is produced

from meat than from vegetables, and therefore he agrees with Wegele that little meat, fish or fowl should be eaten by those suffering from auto-intoxication.

Tibbles also very pertinently draws attention to the fact that there is a difference in the effect of carbohydrate foods. Bread, potatoes and legumes give rise to most organic acids and flatulence, because a considerable proportion is carried into the ileum, where the alkalinity and slower peristalsis favor bacterial action. Since rice, sago, tapioca and arrowroot are absorbed almost entirely in the jejunum or upper part of the ileum, they may be consumed, with stewed fruits, the acidity of which assists in checking bacterial growth. The rest of the food may consist of a little bread and butter, a small amount of roasted or grilled meat, cooked vegetables, milk and a little red wine. The patient should avoid most kinds of fish, game, pork, veal, hashed meats, stews, rich gravy, soups, meat extract, pastry, cheese, tea and coffee.

It will be seen from the foregoing that the dietetic treatment of cases of auto-intoxication is of the utmost importance. The special value of the soured milk treatment and of various lactic acid bacilli has already been considered in Volume I, Chapter XII.

The following articles of alimentation should only be given in the most restricted amounts: jams, sugars, sweets and confectionery; pastry, sweet cakes, new bread and hot rolls; made dishes of all kinds and all canned fruits; pickles, sauces, spices, caviare and rich gravies; lobsters, mushrooms, shrimps, sardines, etc.

Auto-intoxication Not an Appropriate Term.—The term auto-intoxication has been employed throughout the foregoing discussion, because it was the term originally applied to the condition by Combe and because it has been very generally adopted. It is not, however, an appropriate term. The term alimentary toxemia more correctly defines the condition. It must be further understood that the author has an open mind on the question of the maleficent influence of alimentary toxemia. Kemp suggests the term chronic intestinal putrefaction and further suggests its division into (a) indolic type; (b) saccharobutyric; (c) mixed type. While he has set down Metchnikoff's and Lane's views on the matter, that is not to say that he is in total agreement with these views. Perhaps the majority of physicians think that Lane has exaggerated the evil effects of this supposed poisoning of the system by means of putrefying foodstuffs in the intestine. The word supposed is used for the reason that some authorities do not believe that the human organism is thus poisoned by the agency of the intestines. That some degree of self-poisoning is brought about

by the means suggested by Metchnikoff and others seems evident, but exactly how it is produced is not so evident, and that it is productive of all the ills attributed to it by Lane is doubtful.

As said before, the author has an open mind on the matter, and therefore before concluding this dissertation on the condition, it will be quite in place to review briefly some of the opinions of other authorities besides the school of Metchnikoff. These students of alimentary toxemia deplore the unfortunate tendency to ascribe so many human ills to the condition.

According to these investigators, among whom is Robert Coleman Kemp, self-poisoning, strictly speaking, is due to substances arising within the organism, to products of metabolism, or derivatives of disintegrated or disorganized cells. Adami has been one of the chief opponents of the validity of Lane's theory in its entirety. He holds, and it seems with a considerable amount of justification for his belief that products which arise in the alimentary tract by the action of invading organisms from without, are not auto-intoxicants.

As an example of this point of view, in the case of botulism, the *Bacillus botulinus* has been isolated from raw ham, and it has likewise been asserted that *Bacillus paratyphosus* takes beef as a habitat and that the fever is produced by toxins generated by bacilli of this character in ingested beef. It is further pointed out that in some cases of primary and secondary anemia which had apparently originated in the intestinal tract and in which pronounced evidence of excessive saccharobutyric intestinal putrefaction lent distinct weight to the belief that the intestinal condition was the main cause, streptococci sometimes of oral origin have been found, seeming to show that these conditions were due to a combination of intestinal putrefaction and infection from without by means of streptococci.

Adami holds that many cases of so-called alimentary toxemia do not of necessity have their starting point in the lower bowel, but are due to the carriage of bacteria through the mucosa at any point from the mouth to the anus and that the leucocytes may act either as carriers or destroyers of these organisms. Inflammation of the alimentary tract increases the passage of leucocytes from the inflamed area and increases the carriage of bacteria into the blood. This may result in an active inflammation in some other regions, or in the condition attributed by Adami to "sub-infection," due to liberated toxins which poison the cells in their vicinity, and produce the veils of intestinal stasis described by Jackson, Lane and others, as well as numerous other affections and diseases which Lane refers to as results of chronic intestinal intoxication. An anemia appar-

ently pernicious, for instance, according to Adami's theory, may be caused by chronic excessive intestinal putrefaction or through chronic excessive intestinal putrefaction plus streptococcus infection, or through subinfection.

With regard to the effects of intestinal putrefaction opinions are thus seen to be divided. On the whole, it may be stated that Lane's views are not generally accepted in their entirety.

Protein Poisoning (Anaphylaxis).—If proteins enter the blood without being properly changed by the action of the digestive juices, then they must be digested in the blood and tissues (parenteral digestion), and during this process the protein poison is set free and exerts its deleterious effects on the body. Special idiosyncracies to certain foods, such as urticaria from absorption of protein (anaphylaxis), can be thus explained. Formerly "auto-intoxication" was the explanation of such cases.

Robert Coleman Kemp, in the recently published third edition of his work on the Diseases of the Stomach, Intestines and Pancreas, points out that chronic intestinal putrefaction is in itself a serious condition, and may be responsible not only for nervous symptoms, but the resulting toxemia may directly affect the kidneys and produce nephritis. From his personal observations, it may cause high arterial tension and ultimately arteriosclerosis with cardiac lesions. L. Faugeres Bishop, who has written at length on the subject, is, moreover, of the opinion that protein absorption may be a factor in the production of arteriosclerosis.

The views of Kemp on the subject of intestinal putrefaction and its consequences are so interesting and in many respects so new that it will be well worth while to quote them at length. With reference to the indolic type, he draws attention to the fact that indicanuria designates the presence of indican in the urine. Indol is absorbed from the intestines and forms in the liver, indoxyl, potassium sulphate or indican. There are various causes of indicanuria; excessive protein diet, catarrh of the small intestine causing alterations in the mucosa and increased intestinal putrefaction, typhoid, cholera, etc., constipation, alimentary putrefaction, partial or complete obstruction of the common bile duct, decrease of normal digestive fluids, intestinal obstruction, peritonitis, fetid bronchitis, tuberculosis with pus cavity, gangrene, etc. Certain drugs such as salol, salophen and creosote give reactions which must not be mistaken for it, while hexamethylenamin causes its disappearance. Baar, after a series of tests, concluded that non-constipated cases showed indicanuria more frequently than constipated, and assumed that constipation has no bearing upon the production of indicanuria, a conclusion with which Kemp does

not agree. Baar imputes indicanuria only to some anatomic lesion of the intestinal tract. With this view Kemp agrees in so far that an inflammatory lesion may be a factor.

In patients who have increased in fat due to a sedentary life, even in the case of former athletes, persistent indicanuria will occur during the winter months when little exercise is taken. Kemp has observed this in patients who have daily normal bowel movements. This condition persists or recurs in spite of rigid diet and treatment, but disappears in summer with active exercise. Sedentary life with fat accumulation and insufficient exercise, without constipation, may therefore produce indicanuria as a result of disturbed metabolism.

Patients often complain of some difficulty other than constipation, when, on close questioning, it is found that normal bowel action occurs every other day or every third day or more. With some apparently healthy persons this is a normal condition. They may have no disturbing results from this habit, no headache, no nervous symptoms and no indicanuria. Evidently they do not absorb indol. These are individual peculiarities. With others, constipation is a marked factor in producing indicanuria. Indicanuria is an evidence of intestinal putrefaction. Excessive quantity of protein, especially of meat, may be a cause. Any condition favoring stagnation in the intestines helps to produce this condition. Imperfect action of a cathartic can produce indicanuria. In children little indican appears. Many adults show indican and are free from symptoms, but the same is true of constipation.

Finally, persons with indicanuria show clinical evidences of intestinal disorder and sometimes symptoms of auto-intoxication, frequently affecting the nervous system. Neurasthenic and even melancholic symptoms may be dependent on this form of auto-intoxication. According to Herter, headache, migraine, myasthenia, epileptiform seizures, early fatigue, cyclic vomiting and progressive muscular atrophy may also be dependent on this condition. Intestinal putrefaction may directly affect the liver and kidneys. Kemp treated a patient with marked indicanuria with bile in the urine, albumin casts, cylindroids and diminished urea. Treatment of the intestinal putrefaction cleared up this condition. This corroborates the view of W. H. Porter(9), that excessive intestinal putrefaction may cause disturbance of the hepatic cells. Kemp believes, too, that cirrhosis of the liver may result from chronic intestinal putrefaction just as may arteriosclerosis.

After discussing at some length the production of arteriosclerosis by the agency of indicanuria, Kemp recommends the following diet: Mat-

zoon, kumiss, lactone-buttermilk, bacillac; later, stale crackers with butter, boiled rice, jellies and gelatin, are to be added. Herter shows that clinically the carbohydrates have an influence and the substitution of a quickly digested carbohydrate, like rice, which has been well cooked and forced through a colander, on large quantities of bread or sugar will lessen the excretion of indican. Taka-diatase or cellasin can also be given to aid their digestion. Stress is laid by Kemp on the value of medication by means of hexamethylenamin in the treatment of indicanuria. He states that 5 or 10 grains of this drug with benzoate of soda 10 grains has cleared up many cases, albumin, casts, bile and indican disappearing within a short time. The author, in the treatment of the indol type of indicanuria, recommends hexamethylenamin combined with lactic acid bacilli, liquid form and sour milks. With regard to the saccharobutyric type of intestinal putrefaction, due to the *Bacillus aerogenes capsulatus*, Kemp advocates a different kind of diet. Patients who suffer from this condition do not tolerate well either carbohydrates or acids, flatulence and diarrhea occurring after use of cereals, starchy food and especially sugar.

With regard to the treatment of the combined saccharobutyric and indolic type, Kemp secured excellent results by enteroclysis and fermented milks, without medication. General dietetic treatment of the saccharobutyric type includes careful mastication of the food, cleanliness of the mouth and correction of gastric disturbances. Sugars should be omitted, starchy food cut down and meat diminished or eliminated if the mixed type with indican be present. Taka-diatase, gr. v, t.i.d., aids starch digestion. The pancreatic ferments are of service, as are lactic acid bacilli, in the mixed types of putrefaction.

THE DIARRHEAS

It must always be borne in mind that diarrhea is a symptom of many diseases, both of organic and functional origin. Hawkins suggests the following classification:

1. Diarrhea may arise from the ingestion of irritating indigestible or decomposing food.
2. It may result from defective gastric digestion. In most examples of gastric disorder, in intestinal stasis, for instance, there is usually constipation, and particularly is this the case in hyperacid states. But diarrhea is sometimes noted as occurring when the secretion of hydrochloric acid is diminished or even absent. This diarrhea of gastric origin is probably due to the entrance into the bowel of material that has not been sufficiently prepared in the stomach, and it is not improbable that this insufficient preparation consists partly in inadequate dis-

infection of the food. At any rate, an important preparatory and protective function of the stomach has failed.

3. Theoretically, diarrhea can result from defects in quantity or quality of bile or pancreatic secretion; succus entericus probably plays a very important part in intestinal digestion, but little is known of the results that follow its failure. In addition to its action on cane sugar and maltose, it seems to reinforce all the ferments of pancreatic secretion. Its alkalinity may also be of use, and a decrease in its secretion may thus have ill effects by allowing increased acidity in the small intestine.

4. Inflammation of the bowel, catarrhal or croupous, and ulceration of any origin are important causes. Generally speaking, the diarrhea is more violent in disease of the colon than in disease of the small intestine.

5. The effect of an abnormal growth of bacteria in the bowel with alteration in numbers, virulence or species, as in typhoid fever, cholera and some forms of colitis, and the effect of toxemia, bacterial as in septicemia, or toxic as in uremia, may be followed by diarrhea.

6. Finally, we may feel sure that in some cases diarrhea depends on nothing more serious than a perversion of peristalsis, either of central nervous origin or as a result of an abnormal sensibility of the intrinsic nervous mechanism in the intestinal wall.

It will thus be seen that although some attempt must be made to utilize the above theoretical considerations, if dietetic treatment is to be accurate, in practice many difficulties are presented. It is difficult in the extreme to lay one's finger on any single cause of diarrhea. These causes interlap and interact, so that they defy analysis. All diarrheas are more or less influenced by bacteria, whatever may be the exciting cause. Strasburger has demonstrated that in all forms of diarrhea the output of bacteria in the stools is greatly increased. Accordingly, the treatment of diarrhea from the standpoint of diet depends to a great extent upon how much bacterial growth in the intestine can be influenced by alteration and manipulation of food.

Hawkins, in Sutherland's "System of Diet and Dietetics," draws attention to the fact that, so far as the colon is concerned, digestion proper is at an end. Therefore, the character of the food cannot have any material influence on bacteria of the colon, save indirectly by the choice of a diet leaving little residue and containing no hard or irritating particles. In the small intestine, on the other hand, it is likely that diet has some influence on bacterial growth, though, as said before, it is by no means easy to put theory into practice.

On account of the constant production of acids by bacterial action on carbohydrates, the contents of the small intestine remain acid, despite the persistent neutralizing effect of the alkaline succus entericus. It does

seem probable that such acidity is of value in checking the growth of putrefactive protein decomposing organisms, and it is obvious that under certain abnormal conditions the intestine is overrun by putrefactive bacteria, when frequently a state of auto-intoxication supervenes. An increase of the carbohydrate element in the diet should, by increasing the acidity, protect the intestine to some extent against the putrefactive bacteria. There are instances, already referred to under auto-intoxication, when a milk-carbohydrate diet is indicated.

Considerations in Diarrheas.—Kemp classifies two forms of diarrhea; first, with intestinal lesions; second, without such lesions. The first group is described in the appropriate sections. The second group, with no intestinal lesions, may be classified as follows: 1. Diarrhea due to irritation from the bowel contents. Diarrhea dyspeptica, diarrhea gastrica, diarrhea stercoralis, and diarrhea entozoaica are subdivisions. 2. Diarrhea due to irritants transmitted in the blood, such as the uremic type. 3. Diarrhea nervosa, due to irritation of the nervous system. 4. Diarrhea cathartica. This type is placed in a class by itself. Colocynth and aloin in excess may also produce the condition. The majority of purgatives stimulate the peristaltic action of the entire intestinal tract. The peristaltic action of the large intestine is chiefly affected by the aromatic laxatives. The movements in this type of cases are thin and liquid, since increased peristalsis interferes with the absorption of the ingesta and intestinal secretions. With the alkaline salts the action is not only to increase peristalsis, but they withdraw the water from the blood and stimulate the intestinal secretions. The prolonged use of gastric purgatives or excessively large doses produces an acute catarrh of the intestines.

Diarrhea dyspeptica may be brought on by certain articles of diet, such as fresh fruit, cucumbers, pickles, cabbage, turnips, beet, etc. Patients vary as to susceptibility. Milk produces diarrhea in some, but constipates others. Overeating or drinking too much water or beer with the food may prevent gastric digestion, and the ingesta entering the intestines unchanged may cause diarrhea. Intestinal fermentation or putrefaction, spoiled food, and auto-intoxication may produce diarrhea. With the last the diarrhea is due to more than the mere local action.

In neglected or severe cases of pure dyspeptic diarrhea, long continued irritation may give rise to true catarrh. Einhorn and Oppler first called attention to diarrhea gastrica or diarrhea resulting from disturbances of the stomach functions. With hypochlorhydria and achylia, diarrhea with intestinal symptoms such as flatulence, borborygmi, and colicky pains may predominate. The stools are often quite undigested.

If constipation occurs in a person whose bowels are usually regular, diarrhea may follow the attack of constipation. This form is known as *diarrhea stercoralis*. It is believed that the diarrhea is caused by the development of gases in the intestinal contents as a result of the stagnation of the fecal matter. Intestinal parasites, tapeworm, for example, may, in some cases, cause persistent diarrhea, and this form is termed diarrhea entozoica. All these forms of diarrhea if long continued will produce enteric catarrh. Diarrhea may also be brought about by the hypodermic injection of certain drugs.

Diarrhea nervosa depends on nervous disturbances, without any morbid changes in the walls of the intestines. Trousseau first described nervous diarrhea as a condition without impairment of digestive functions. It originates either from excessive stimulation of the nerves governing peristalsis, the motor function, or from the transudation of serous material into the intestinal canal, the secretory function, produced by nervous influences. In some cases probably both factors are concerned. This form of diarrhea is found as a symptom in hysteria or neurasthenia, in the nervous and debilitated, and even in healthy persons after a nervous shock. Nervous diarrhea has also been attributed to excessive smoking. Diarrhea may occur after a sudden or severe chill from exposure to cold, or wetting of the surface of the body, especially the feet or abdomen. Probably it is due to reflex irritation, transmitted from the cutaneous nerves. This type of diarrhea is usually transitory.

DIET IN DIARRHEA.—Carbohydrates may produce fermentation, which protein feeding will alleviate. Hawkins, after weighing carefully the situation, concludes that in most cases of diarrhea, except those of purely nervous origin, dietetic treatment involves (a) recognition of the cause, (b) a choice between a milk-carbohydrate and a protein diet. The decomposition of protein is best met by a milk diet or a milk-carbohydrate diet in which milk is the chief article. In irritative and inflammatory conditions of the small intestine, a reduction of carbohydrates and the substitution of protein and fat would appear to be the line of treatment called for. Still here, as so often in the medicinal treatment of disease or abnormal conditions, it is a case of *experimentia docet*. The value then of a pure milk diet would seem to be owing mainly to the small residue which enters the colon, and consequently it is in diseases of the colon that it finds its chief use. Finally it may be laid down as a golden rule that in all forms of diarrhea, articles of food containing cellulose, vegetables, fruit, coarse breadstuffs and grains, sugar and meat extracts should be forbidden. On the other hand, it is a well-known

fact that in the diarrhea of infants and young children during the acute stage a diet of strained barley water (Robinson's prepared barley) is preferable to milk.

In acute attacks of diarrhea from whatever cause, it is well to prohibit all food from twenty-four to forty-eight hours. During this time, only water should be given, barley water, tapioca gruel or egg water.

As pointed out previously, the indications in all forms of diarrhea are to give foods which will produce as little residue as possible. According to Davis, after twenty-four or forty-eight hours of abstinence, broths may be given either with or without soft-boiled rice, tapioca, sago or cracker crumbs. Only small portions should be taken at a time because the intestinal residue will thus be limited and because the organs have a diminished power of digesting and absorbing.

An exclusive milk diet is the best with which to commence, except in infancy or when it was the exclusive diet at the time of the onset of the attack. When this is the case, abstinence at first, and later a diet of egg water and broth should be taken. When milk is not well borne, broths must be substituted for it.

Other Classifications of Diarrheas.—While Kemp classified the diarrheas under many subdivisions, several other authorities divide them broadly into catarrhal enteritis, nervous diarrhea and colitis. In reference to acute catarrhal enteritis, Hawkins points out that there are some cases which are obstinate to treatment. He is inclined to think that catarrhal enteritis is not a clinical entity, but it is likely that bacteriological varieties are included under this head. For example, an important difference is to be noted in the character of the stools. Sometimes these look like rice water and are almost without odor, and, at other times, are very offensive and suggest putrefaction of protein material. In the first instance, it may be wise to give milk and little carbohydrate until conditions have changed for the better. The diet best adapted to the circumstances then would be albumin water, whey, raw meat juice, panopepton, barley water, tea, arrowroot made with water and boiled flour, gruel, in all of which, according to Hawkins, alcohol can be given if required.

Catarrhal Enteritis.—Under the head of "chronic catarrhal enteritis," Notlmagel has grouped various irregularities of the bowel, and, as Hawkins says, while there may be difference of opinion as to their nature and there may be a strong suspicion of a nervous element in some of them, they are recognized conditions. Under this head may be included: (a) cases in which constipation regularly alternates with diarrhea, the diarrhea stools being thin or soft, mixed with mucus and attended with pain;

(b) cases in which there is a daily evacuation of unformed and pultaceous feces; and (c), persistent diarrhea, attributed by Nothnagel to an irritating excess of acidity in the small intestine, which occasions increased peristalsis, so that the contents of the small intestine are hurried to the anus, as is shown by the presence of unaltered bile pigment in the stools. It is obvious that the first step to take is to try to find out the origin of the diarrhea, whether it arises from bacterial defect or otherwise. However, Hawkins thinks that it is doubtful if the origin and nature of this group are sufficiently constant to warrant any dogmatic statement as to an appropriate diet; but in his experience, it seems certain that in some cases of continuing diarrhea improvement will result from such a diet as the following:

DIETARY CHRONIC CATARRHAL ENTERITIS

	Calories
8 A.M. Cocoa made with water; 1 or 2 eggs.....	280
10 A.M. Bouillon with an egg.....	100
12 M. Chicken or fish; piece of toast; custard; claret glass of Burgundy ..	390
4 P.M. Panopepton, 1 egg; piece of toast.....	190
7 P.M. Sweetbread, chicken or fish, piece of toast, claret glass of Burgundy..	350
TOTAL NUMBER OF CALORIES.....	1,310

The following is the diet recommended by Wegele:

	Calories
8 A.M. Cocoa, 200 grams; 1 egg.....	285
10 A.M. Kefir (4 days old), 240 grams.....	129
12 M. Soup, 250 grams; 1 egg, roast chicken, 150 grams; mashed potato 250 grams.....	621
2 P.M. Cocoa, 250 grams.....	200
6 P.M. Kefir, 250 grams.....	129
8 P.M. Soup, 200 grams; 1 egg; sweetbread, 100 grams.....	286
10 P.M. Kefir, 250 grams.....	129
<i>During the day:</i>	
Zwieback or toast, 75 grams.....	125
Butter, 20 grams.....	180
Whortleberry wine, 250 grams.....	150
TOTAL NUMBER OF CALORIES.....	2,234

Kemp objects to the use of alcohol in catarrhal cases of diarrhea and states that boiled rice, baked and mashed and boiled potatoes act well in diarrheal forms of catarrhal conditions of the alimentary tract, as do boiled milk and milk and lime water. In some individuals suffering from

diarrhea sour milk is beneficial; in other persons it tends to aggravate the diarrhea.

The following diet list, taken from Boas, illustrates the method of prescribing nourishment in chronic catarrh of the intestine accompanied by diarrhea:

DIETARY CHRONIC INTESTINAL CATARRH (Boas)

- 8 A.M. Eichel cocoa, in water; 1 saccharin tablet, or crystallose; toast and butter, 20 to 30 grams.
- 10 A.M. 1 cup, 200 gram rice gruel; buckwheat, or oaten grits in veal bouillon; avoid salt.
- In addition: 50 grams roasted veal or beef, scraped; fried fish or cold meat; avoid salt or strongly pickled ham.
- 1 P.M. Soup of peas or beans or purée of oatmeal, farina, or cornstarch, etc.
- Addition of nutrose or eucasin allowed; somatose forbidden. In summer huckleberry soup, with saccharin if desired; 200 grams of rice bouillon, well thickened by cooking; avoid rice with milk or farina bouillon; green vegetables or potatoes in purée form, 50 to 100 grams; butter sauce allowed; cream sauces or highly seasoned sauces forbidden; stewed fruits, with the exception of huckleberries; custards, cornstarch, with a little yolk of egg and saccharin allowed; avoid fruit juices.
- As beverages—huckleberry wine, Burgundy, Camarite, Simaruba wine, old Bordeaux. Sweet wines, white wines and effervescent beverages forbidden.
- 4 P.M. Tea, without milk, with saccharin or cocoa; cakes, toast; zwieback with butter.
- 7 P.M. Strained gruel, oatmeal, etc.; cold or warm meat, 50 grams; toast, butter, 20 grams.
- 9 P.M. 1 glass of huckleberry lemonade, warmed or hot wine; saccharin, or tea without red wine.

DIETARY FOR CHRONIC INTESTINAL CATARRH WITH DIARRHEA (Zweig)

- 7 A.M.
- Acorn cocoa, cooked in milk, 1 saccharin tablet; toast; butter.
- Breakfast*—8 A.M.
- 1 or two eggs; toast; butter.
- Dinner:*
- Soups, rice, barley, oatmeal without salt; minced meat or fish cooked in butter; gelatin; rice or macaroni; 1 or 2 glasses of red wine; toast.
- Afternoon Tea*—4 P.M.
- Same as breakfast.
- Supper:*
- Soup; fish minced; gelatin; 1 glass of red wine; toast, butter.

In the treatment of chronic diarrhea, Fenwick rightly emphasizes the fact that while the chief place must be assigned to diet it must be recog-

nized that a patient may suffer from chronic diarrhea for weeks, months or even years, and his diet must be so arranged that it will supply all the needs of his body and enable him to perform his daily duties as far as possible. Such a diet should exclude all superfluous and indigestible articles, and those that are mainly useful as affording bulk, *e.g.*, vegetables containing cellulose. The vegetables that contain least cellulose are cauliflower, young spinach, cucumbers, vegetable marrow, potatoes, artichokes, onions, green peas. The permitted vegetables should be given in the form of purées, that is, strained to a fine semi-liquid paste. Apples may be eaten reduced to a pulp in the form usually served as apple sauce; boiled rice often takes the place of a vegetable, as it is free from cellulose. All articles containing bran, such as brown bread and oatmeal, must be forbidden; all starchy foods must be well cooked, a condition which excludes pastry. Meats must be finely divided and their fiber should be easily digestible; so that smoked and salted meats and fish, pork and veal, duck and goose, salmon, mackerel and eel, lobster and crab must be prohibited.

DIETARY FOR CHRONIC DIARRHEA (Wegele)

SEVERE CASES

		Protein	Fats	Carbo- hydrates	Alcohol
<i>Morning:</i>	200 gm. acorn cocoa (boiled in water)	2.3	3.60	12.0	
	1 soft-boiled egg	6.0	5.00		
<i>Forenoon:</i>	250 gm. decoction of whortleberries from 80 gm. dried berries	0.6	1.30	4.7	
<i>Noon:</i>	250 gm. soup	5.5	4.00	7.5	
	1 egg in the soup	6.0	5.00		
	100 gm. scraped meat (lean) . .	20.7	1.50		
	50 " rice in bouillon	4.0	0.50	38.0	
<i>Afternoon:</i>	250 " whortleberry decoction .	0.6	1.30	4.7	
<i>Evening:</i>	250 " maltoleguminose soup .	6.5	0.25	15.5	
	1 egg in soup	6.0	5.00		
	150 gm. minced chicken	15.0	9.00	12.0	
<i>During the day:</i>	75 " zwieback	9.0	1.50	42.5	
	200 " whortleberry wine . . .			7.0	17.0
<i>Night—10 P.M.</i>	250 " barley mush (20:250) .	5.0	4.00	25.0	
	Total	87.2	41.95	168.9	17.0
	Calories	360	390	690	120

ENTIRE NUMBER OF CALORIES 1,560

DIETARY FOR CHRONIC DIARRHEA (Wegele)

LESS SEVERE CASES

		Protein	Fats	Carbo- hydrates	Alcohol
<i>Morning:</i>	200 gm. acorn cocoa.....	2.30	3.6	12.00	
	1 egg.....	6.00	5.0		
<i>Forenoon:</i>	240 gm. kefir (four days old) ..	8.20	5.7	2.00	3.3
<i>Noon:</i>	250 " soup.....	5.50	4.0	7.50	
	1 egg.....	6.00	5.0		
	150 gm. roasted chicken.....	28.00	10.0	1.80	
	250 " mashed potatoes.....	6.00	1.7	42.70	
2 P.M.	250 " acorn cocoa.....	2.30	3.6	12.00	
6 P.M.	250 " kefir.....	8.20	5.7	2.00	3.2
8 P.M.	200 " soup.....	3.30	6.0	17.00	
	1 egg.....	6.00	5.0		
	100 gm. sweetbread.....	28.00	.05		
10 P.M.	250 " kefir.....	8.20	5.7	2.00	3.3
<i>During the day:</i>	75 " zwieback or toasted bread.....	9.00	1.5	42.50	
	20 " butter.....	0.15	16.6	0.12	
	250 " whortleberry wine....			8.75	21.5
Total.....		127.15	79.6	150.25	31.3
Calories.....		520	740	615	210
ENTIRE NUMBER OF CALORIES.....				2,085	

Saundby, an English authority of large experience, points out that it is best to prescribe a restricted diet at first, in order to get the disease under control; such a diet may consist of milk exclusively or of milk thickened with flour, a tablespoonful to a pint, or underdone minced or scraped meat, three meals a day each of four ounces, the meat being freed from fat, cooked lightly and eaten without condiments, bread or vegetables, each meal to be followed two hours later by three-quarters of a pint of hot water. But on this diet the amount of nourishment given is so small that the patient should be kept at rest as far as possible. In the dietetic treatment of chronic diarrhea or "chronic catarrhal enteritis," it may be again emphasized that as the condition varies, so must treatment by means of diet. The origin of the diarrhea must be sought for and the diet must largely depend on the result of this search.

Diarrhea Due to Colitis.—With regard to the dietetic treatment of diarrhea due to colitis, the primary cause is often catarrhal enteritis, but in some cases the stools indicate that the colon alone is affected.

The secondary cause of colitis is a diet which disagrees, especially in those who have previously suffered from dysentery. In all cases, primary or secondary, Hawkins holds that milk only should be taken, either diluted,

four or six to one of lime water, soda water, or barley water, or as blanch-mange made with isinglass, seventy ounces, or 1,400 calories may be given and occasionally even more. Any departure from a milk diet should be postponed as long as possible. The final additions to the diet should be a small allowance of carbohydrate, the yolk of egg and plasmon. A return to meat, meat extracts and vegetables must be made with the greatest caution.

In the treatment of diarrhea in acute colitis, Kemp advises against cold drinks. Somatose is useful. Warm teas such as chamomile, fennel, anise seed or plain tea, and gruels, barley or rice, with or without milk, very dilute milk with lime water, etc. should be given. Milk is often indigestible and barley broths preferable. Later, bouillon, water soup, bread softened in hot water with butter and salt, yolk of egg or white, or entire egg raw or boiled, stale bread, boiled water, etc. Avoid carbonated water. Vichy and milk may be given provided the gas is allowed to pass off before drinking. As soon as the diarrhea stops, soft-boiled eggs, calves' brains, scraped beef, mashed potatoes, cocoa, weak coffee, chicken, chops, steak, stale bread and butter, potatoes mashed or baked, can be given. Fruit, green vegetables, hot bread, fat, and acids should be avoided for a considerable time.

In severe diarrheal cases of chronic colitis, milk and lime water equal parts, or boiled milk, or milk and barley water, or rice water in combination, often are efficacious. In a few cases, however, these preparations are objectionable and aggravate the diarrhea. Somatose in 1 dram doses, also raw eggs beaten in milk, are sometimes of value. In milder cases of diarrhea, the diet may be more liberal. Carbonated waters, lemonade, fruits, salads, acids, cabbage, cauliflower, rye bread, brown bread, ice cream, pastries, oatmeal, green vegetables, corn and beans, turnips, carrots, beet, radishes, celery and lobster should be avoided. Mashed and baked potatoes, rice, sago, macaroni, bread well baked and toasted, with a moderate amount of butter, cream, soups, bouillon, soft-boiled or scrambled eggs, sweetbreads, calves' brains, chicken, lamb chops, lean fish, cocoa, tea and milk, or matzoon in selected cases, can be given. The drinks should not be too hot or too cold and an excess of liquid should be avoided. (See also dietary, Volume III, Chapter XXVIII.)

CHRONIC INTESTINAL OBSTRUCTION

Chronic Intestinal Obstruction.—In chronic cases of intestinal obstruction, some food is often given with advantage, and, of course, it

should be such as is easily digested and absorbed. In the majority of these cases, the cause of the obstruction is carcinoma of the colon. Consequently both gastric and intestinal digestion are considerably impaired. The foods to be avoided are salads, heavy vegetables and fruits, while milk broths, eggs, boiled meats, chicken and sweetbreads, boiled fish, rice, farina, toast, crackers and butter are permissible. Some authorities advise a more restricted diet; small quantities at short intervals of peptonized milk, somatose, panopepton, peptonized beef jelly and so forth being the most useful adjuvants.

DIET IN CHRONIC INTESTINAL OBSTRUCTION.—Kemp(10) says that in chronic intestinal obstruction the proper regulation of diet, omitting foods which will mechanically fill up the intestines, and a careful regulation of the bowels are most important. Substances that give a large residue of fecal matter, which are irritating and extremely constipating, should be excluded. Matzoon, kumiss, buttermilk, bacillac, lactone, buttermilk and kefir milk are excellent; as a rule, milk agrees well and is readily digested; in some cases, however, it constipates and is not digested. Raw eggs beaten up in milk, and soft-boiled eggs, broths, soups, gruels may be given. Tropon and somatose are of value, given in broths or milk. If the stenotic symptoms are progressive or fairly marked, liquid or soft diet alone should be given. In milder cases, scraped beef, tender meat, well divided, butter, a small amount of well toasted bread, rice, sago, and mashed potatoes in small amounts are admissible. The patient should eat a small quantity, frequently and should always take food sufficient to preserve his nutrition. Very hot or very cold drinks should be avoided. Irritating substances, such as mustard, spices, pepper, vinegar, fruits in bulk, and green vegetables in large amounts should be forbidden. Food giving a large residue of fecal matter should be prohibited. Spinach is of service to aid bowel action. Fats such as cream and butter are useful. Fresh fruit juices are valuable and the drinking of a glass of water on rising is of service.

Summarizing, the diet in chronic intestinal obstruction must be governed largely by the stage of the disease, in fact, by the general condition of the patient. Suitable food in sufficient quantity is needed to improve nutrition, but when food is not properly digested and assimilated, it would be folly to give more than can be more or less adequately utilized. Chronic intestinal obstruction in most cases is the result of carcinoma of the colon, and digestion is always impaired. With regard to diet for such patients, the food given must be light, as nourishing as possible, and administered in small quantities at frequent intervals. The physician

in charge must be the best judge of dietetic treatment in a given case of intestinal obstruction.

DYSENTERY

Acute Dysentery—DIET IN DYSENTERY.—In the acute forms of dysentery, which as a rule are of bacillary origin, and are met with in asylums, prisons and amongst troops during campaigns, it is advisable in the majority of cases to withhold almost all food for a period of twenty-four to thirty-six hours after the onset. Mason and Daniels, in Sutherland's "System of Diet and Dietetics," state that the only nourishment given should be barley water or rice water. Fluid must be given either as plain water or egg albumin water or in the form of the above mentioned farinaceous drinks (*see* Volume II, Chapter XVII). Only a small amount should be given at a time and this must be at the right temperature. During the first day or two of acute dysentery the nurse is directed to give the patient a wineglassful of slightly warmed fluid of the kind named above every two hours, administered in teaspoonfuls. No other food or drink should pass the lips. By the second or third day provision will have to be made for the nourishment of the patient. Such nourishment must be of a kind to keep up the strength and must be given at regular periods. In the presence of dysentery, the lining of the colon is irritated and inflamed, sometimes to the point of ulceration and sloughing. It must therefore be kept at rest as far as possible. The first stage of acute dysentery is usually associated with a severe catarrhal condition of the entire alimentary tract; the tongue is foul and coated, and the gastric digestion very weak. A liquid diet alone is obviously indicated, and the question remains as to what form of liquid diet is most suitable.

When the tongue is thickly coated, raw milk is digested with great difficulty, and until the tongue has become clean should be replaced by barley water, rice water, egg albumin water, very thin broth of chicken or mutton, rice or barley water in which chicken has been boiled, or chicken jelly. These should be given in small quantities at short intervals and at an appropriate temperature. When the tongue looks clean and gastric digestion is presumably improved, milk at first well diluted or peptonized or raw egg and milk may be gradually given, and together with rice or barley water should for some time constitute the only food.

As an all around food in dysentery, whether acute or chronic, when it is desired to give the patient the maximum amount of nourishment with the minimum amount of irritation, Mason and Daniels consider no food better adapted or more readily procurable than milk and rice or barley

water, in the proportion of two of the former to one of the latter. A little salt may be added according to taste, or the mixture may be peptonized. It should be given slightly warmed, sipped with a teaspoon, and in quantities of from 5 to 10 ounces every two or three hours. Such a diet is apt to be monotonous, and as an occasional change one of the many malted foods on the market may be substituted. In Kemp's opinion, the yolks of 5 or 6 raw eggs daily or entire raw eggs may be beaten up in the milk or barley gruel, or added to chicken broth. As the condition improves and when the stools are free from blood, arrowroot well boiled, cornstarch, semolina, tapioca, revalenta and foods of a like description may be added. When the stools begin to show the normal consistency, hot bread and milk, chicken panada, rusk, boiled white fish, and underdone egg, custard, light milk pudding and well boiled rice will serve until further improvement warrants a return to ordinary diet.

However, "hasten slowly" should be the motto and a wise caution is always indicated in the diet of a dysenteric convalescent. The lack of fresh vegetables makes itself felt after a time, but their introduction must be brought about discreetly. No coarse vegetables should be eaten. Thoroughly boiled or mashed potato, stewed or roasted apple, well boiled Spanish onions, and fresh cauliflower seem to be the vegetables best adapted to the circumstances. They must be given in small quantities, carefully watching their effect on the stools.

Dysentery is a rebellious disease and few if any maladies are more dependent upon judicious dieting. The convalescent patient is by no means "out of the woods," and any over-indulgence either in eating or drinking may bring back a recurrence. The diet must therefore be sedulously supervised and carefully restricted both with regard to the quantity and the nature of the food. Red meat and alcohol must be absolutely tabooed as well as the coarser foods which will be mentioned in the section dealing with chronic dysentery. When there appears to be the slightest tendency to a relapse, solid food must be discontinued at once and without any demur, returning to the milk and barley or rice water diet. The sour milks are of value in some cases.

Chronic Dysentery.—Daniels(11) says that chronic dysentery is a term used for two different clinical conditions: (a) sequelæ of an acute attack or of a series of acute attacks, and (b) a distinct disease in which there has not been any acute stage, but in which there has been prolonged irregularity of bowel action with the occasional passage of mucus or of blood and mucus. As regards the first group of cases, the chronic condition is usually the result of a too short course of treatment of the acute

stage or to a too early return to an ordinary diet. In many cases alcohol, not necessarily to excess, will produce the same result.

DIET IN CHRONIC DYSENTERY.—The chronic dysentery of tropical origin, which is usually associated with the presence of *entameba histolytica* in the stools, is perhaps the most common form of chronic dysentery. Diet in the treatment of all cases of chronic dysentery is a vital element of success, but it is impossible to lay down rigid rules of diet. Almost every case must be treated on its merits and it rests very largely with the medical practitioner whether a diet suitable to the condition is selected. He must observe most carefully the effect of the various foods introduced, not only on the stools but on the general nutrition. In this way alone can it be discovered what foods are of advantage and what articles must be prohibited.

With regard to diet, as repeatedly stated, the personal equation must be always considered and food idiosyncrasies must be understood. Some dysenteric patients are so obsessed with the state of their health as to develop hypochondriacal tendencies. Others again pay little attention to a moderate degree of dysentery and are careless even to the point of recklessness. Hypersensitive people, alarmed at the slightest symptoms of dysentery, are apt to be overcareful and exaggerate their fear so as to half-starve themselves rather than run an imaginary risk by eating enough to keep body and soul together. This is largely a question of temperament, and persons of this temperament should be advised not to examine their stools, but to satisfy their appetite, at any rate, to a reasonable extent.

Circumstances again alter conditions. Some sufferers from chronic dysentery are compelled to work hard, while others are in a position to take life easily. Some are naturally of a vigorous constitution, while others are the reverse and may have tuberculosis, syphilis, malaria or other constitutional taints. In prescribing a diet for chronic dysentery all these points must be duly considered.

FORBIDDEN FRUITS IN CHRONIC DYSENTERY.—Mason and Daniels place the following foods and drinks on the prohibited list so far as chronic dysenteries are concerned. First comes alcohol, which should be strictly forbidden in every form, barring very exceptional circumstances. Partially fermented drinks, as gingerbeer, sweet effervescing drinks, as bottled lemonade, cider, and the like are dangerous; strong tea and black coffee may be put in the same category. Iced drinks and large draughts of fluid at meal times should be interdicted.

The following articles of food are also in a general way inadmissible:

Rice soups, strong beef tea; oily fish, as salmon, trout, eel, mackerel, herring, smelt; shell fish, as lobster, crabs, shrimps, prawn; dried, salted or otherwise preserved fish, as Bombay duck, smoked salmon, red herring, dried haddock, salted cod, sardines; red meats, as beef, mutton, pork, venison, hare; all birds of the duck tribe, as duck, goose; rich sauces, curries, potted or otherwise preserved meats; coarse vegetables, as peas, beans, carrots; nuts of all kinds; raw vegetables and salads; dried, candied or otherwise preserved fruits, as raisins, currants, orange peel, crystallized fruit, preserved ginger, jams and pickles. Care must be taken not to keep the patient on too monotonous a diet for a considerable length of time.

The disease often persists for a long period, and if the patient is restricted to a very few articles of food, scorbutic conditions may be induced. At any rate, a long-continued diet of a few food materials will not be found the surest road to recovery. Cases with symptoms indicating that the diet is too limited do best on a mixed diet, with short courses of strict dieting and more vigorous therapeutic measures employed at intervals.

DIET IN CHRONIC TROPICAL DYSENTERY.—Chronic dysentery is most frequent in the tropics and being generally due to ameba is best treated by emetin gr. $\frac{1}{2}$ t.i.d., or ipecacuanha, with rest in bed and a diet of milk and barley water only. This mode of treatment may be continued for a week or ten days. Emetin bismuth iodid (tablets gr. $\frac{1}{2}$ each, coated with salol gr. $\frac{1}{16}$) t.i.d., or oil of chenopodium, M. 16-48, following mag. sulph., are of value. After this time, the diet should be gradually changed and eggs, rusks or thin toast, arrowroot, well-boiled rice, chicken broth, boiled fish, pounded chicken, mashed potato, milky pudding, stewed apple, and so forth, added, one article at a time. When this extended diet is found to cause a gain in weight, further increase of food is unnecessary. In time some such diet as the following may be gradually worked up to:

DIETARY CHRONIC DYSENTERY

Breakfast:

One or more of the following: Hot milk and toast or bread; lightly cooked egg; boiled sole or other white fish; thin toast, rusk or pulled bread; a little fresh butter, small cup of weak China tea or of chocolate.

Dinner:

Slice of fowl with bread sauce, or a piece of boiled fish, mashed potato, cauliflower, milky pudding or stewed apples.

Afternoon Tea:

A glass of milk and a rusk,

Supper:

Same as dinner.

Bed-time:

A glass of hot water, or of hot milk, or a cup of some malted food. Small quantities of fresh fruit may be taken, in many instances with great advantage.

According to Mason and Daniels, in Sutherland's "System of Diet and Dietetics," it is good practice in some of the very chronic and persistent cases with marked tendency to relapse to suspend regularly, and as a matter of routine, the mixed diet for one day in a week, give the patient some mild aperient and place him for twenty-four hours on milk and barley water only. When a relapse is threatened, this diet should be resumed at once.

The cure of a chronic dysentery is a most difficult matter, and the only way is by patient and persistent diet and by the administration of those drugs which have been proved by experience to be effective. Any deviation from this line of treatment is inevitably followed by a recurrence of the distressing and debilitating symptoms. Chronic tropical dysentery is due to infection and when the ameba is established in the colon it is no easy task to evict it. It will lie latent for a long time, but an error of diet will quickly arouse it to activity, so that a person who has suffered from chronic dysentery must evince great caution as to his food for months and even years after diarrhea has ceased.

CONSTIPATION

Habitual Constipation.—Chronic constipation is as difficult to cure as chronic diarrhea, and is much more common. Constipation is one of the greatest of the white man's burdens and may be rightly termed the bane of modern civilization. It is perhaps essentially a disease of urban life, because it is largely brought about by sedentary modes of living, by eating and drinking more than is good for one, of articles of food and drink which are not adapted to the needs nor the environment of the individual. Women are, on the whole, more subject to constipation than men. This is partly due to physiological reasons, partly to the manner in which they dress, especially to the wearing of tight corsets and belts, and partly to the fact that they do not take sufficient exercise in the open air. However, nowadays, constipation is of very frequent occurrence among men and is on the increase.

Diet as a Factor in Chronic Constipation (Alimentary Constipation).—Diet is, of course, a prominent factor in the causation of chronic constipation. Although, apparently, the typical diet ought to be one which is entirely

digested, completely absorbed and merely sufficient for the wants of the system, in practice this is not the case. As Lauder Brunton points out (12), the intestinal canal of man, and of the precursors of man, has not been developed at all under theoretically perfect external circumstances, but has been so developed as to deal with the more or less imperfect foods which could be obtained. By cooking our food, the hard parts which would stimulate the intestine mechanically are softened and deprived of their irritating action, which tends to render the movements of the bowel more sluggish. Civilized people are thus very apt to suffer from constipation, especially in cities where the majority are not able to take that amount of exercise in the open air which so greatly promotes digestion, absorption and assimilation. A certain amount of aid is needed to the action of the bowels and may be afforded to some extent by means of more or less indigestible articles of food, which are not entirely absorbed, but must pass through the intestine and be evacuated. Albuminous diet, consisting of meat and eggs, with avoidance of vegetables, butter and fat, tends to constipate.

Lauder Brunton states that in his long practice at St. Bartholomew's Hospital, London, he found that two weeks was by no means an uncommon period for patients to go without evacuation of the bowels. Many of these lived upon a dietary consisting of fine white bread, butter and tea, which, of course, left very little residue. Bad or defective teeth are a frequent cause of constipation. Individuals with defective teeth, being unable to masticate food properly, select articles of food which require little mastication and which for this very reason bring about constipation.

He further points out that the intestine is not only an absorbing viscus, but it excretes the substances destined for elimination. When retained through constipation, these substances may undergo absorption and cause various forms of discomfort and ill health. To avoid such an occurrence, it is essential to have a dietary which is not theoretically perfect, but contains seeds, cellulose or vegetable fibers, and if these do not promote peristaltic action sufficiently, resort must be had to purgatives.

Neurasthenia as Cause of Constipation.—Before discussing the use and abuse of purgatives, it may be interesting to mention briefly a fruitful cause of constipation in these times of rush and bustle. Neurasthenia is intimately associated with constipation, perhaps more frequently than any other condition. Neurasthenia and constipation often appear to be coördinate symptoms. Constipation acts injuriously on the psychological state of the patient, rendering him fretful, irritable, nervous and generally out of sorts.

According to Strümpell, neurasthenia is, as a rule, the primary disease, and the irregularity of the bowel appears as a result of abnormal nervous influences or of secondary conditions. Arbuthnot Lane is of the opinion that neurasthenia is usually the result of the chronic constipation or intestinal stasis. Whichever condition is responsible in the first instance, these two states evidently form a vicious circle, each sustaining and aggravating the other.

As Strümpell points out, the most essential factor is often the hypochondriacal tendency of the patient, who ascribes an excessive importance to irregularity of the bowels and regards every slight disturbance as of extreme gravity. Finally, in this very numerous class of sufferers, this tendency develops into an obsession. In some instances, the constipation is only imaginary—the patient fears to eat a hearty meal and as a result the excreta are scanty. In the majority of cases, the abnormal psychological conditions exert a direct inhibitory influence upon the activity of the intestines, and the bowels lose the habit of regular action. In such a dilemma the patient is apt to become addicted to the bad habit of taking purgatives. Generally speaking, the more he takes of these drugs the more he requires, until at last he is a slave of the habit and in consequence his cure is rendered much more difficult.

Etiology of Constipation.—The etiology of constipation is tabulated by Kemp as follows:

1. Diseases of the stomach, such as hyperchlorhydria, ulcer, cancer, dilatation, simple atony, catarrhal conditions and achylia gastrica.

2. Obstruction of the bowel by tumors of the intestine or tumors pressing on the bowel from some adjacent organ; by stricture within the intestine; by external stricture, as by peritoneal adhesions; by chronic intussusception. Constipation may be caused by kinks and adhesions of the terminal ileum.

3. Catarrh of the small intestine alone; in some cases catarrh of the large intestine; mucous colic; atrophy after catarrh; ulcers of the small intestine are occasionally attended by constipation; dysenteric ulcers at times produce constipation, though ulcers of the large intestine usually cause diarrhea.

4. Voluntary abstention from the stool on account of the pain it produces by reason of disease of the rectum. Spasm, or hypertrophy of sphincter ani or the levator ani muscles.

5. Obstruction to the entrance of bile into the intestine or deficiency of bile.

6. Diseases of the heart, lungs, liver and kidneys.

7. Diseases of the pancreas.

8. Diabetes, anemia and chlorosis.

9. In many diseases of the brain, spinal cord and the nervous system, constipation is present.

10. Acute febrile conditions are usually accompanied by constipation, as pneumonia, etc.

11. Chronic constipation from foreign bodies.
12. Malformations, as dilated colon, diverticula, etc.
13. Defective development or essential primary atrophy of the colon.
14. Enteroptosis, angulatures, prolapse, movable cecum, etc.
15. Atrophy of the intestinal musculature following catarrh or fatty degeneration.
16. Hypertrophy of Houston's valves, or O'Beirn's sphincter, or coccygeal deviation.
17. Loss of power in the abdominal muscles may be a factor in some cases.
18. Distention of the duodenum secondary to compression or obstruction of the third part of the duodenum by reason of a strain exerted on it by the mesentery of the small intestine or by the pull on it by the jejunum.
19. Chronic constipation from impaired physiologic function. This type is due to disturbance of the motor function of the intestines and is strictly classified under motor neuroses, under which are: (a) constipation due to retarded intestinal peristalsis, atony of the bowel; (b) spastic constipation, perverted action or enterospasm; (c) spasm of the sphincter is included under this type. Constipation due to disturbances of the motor function constitutes an important class of cases. Atonic constipation, which with spastic comes under this head, constitutes the majority of cases.

DIET IN CONSTIPATION.—The successful treatment of constipation is a problem extremely difficult of solution. Although many factors make up the sum total of the causes of constipation, a defective diet, a sedentary life and the strain of modern existence are chiefly responsible. It is impossible to change conditions. Man cannot revert to a primitive life, live a free, active existence in the woods in the pure fresh air and subsist upon berries and other edible things that can be picked up. Men and women, by choice or compulsion denizens of overcrowded cities, must adapt themselves to their environment and live as rationally as is possible under such circumstances in order to be healthy and happy, for the terms are synonymous. We shall proceed then on the hypothesis that the chief cause of constipation is a faulty diet. When the nervous mechanism which controls defecation is defective or shows signs of failure, although there are no certain means of raising its excitability and power, an appropriate diet can do much to activate it.

The proper performance of the function depends on certain conditions. Hawkins believes that the actual cause of peristalsis is either:

1. Direct excitation of movement by mechanical distention of the bowel by solids, fluids, or gas; or 2. A local reflex action, subject to central nervous control set up by chemical stimulation of the sensory nerves in the mucosa. Probably both forms of stimulus are at work.

For the former, a certain bulk of residue is necessary, and this will obviously vary on different diets. According to Rubner, 2,438 grams of milk produce 96 grams of feces with a dry residue of 24.8 grams; 1,435 grams of meat produce 64 grams with a dry residue of 17.2 grams; 1,360 grams of black bread, roughly 46 ounces, produce 815 grams with a dry residue of 115.8 grams. Contrary to perhaps general opinion, Hawkins thinks certain experiments seem to show that protein decomposition is actually less in constipation than in health.

Hertz, writing on constipation in adults(13), says that for the rational treatment of constipation it is necessary to distinguish between the two great classes of cases: (*a*) that in which the passage through the intestines is delayed, whilst defecation is normal, intestinal constipation, and (*b*) that in which there is no delay in the arrival of the feces in the pelvic colon, but their final excretion is not adequately performed—pelvi-rectal constipation or dyschezia.

Although dietetic errors are undoubtedly one of the commonest causes of constipation and frequently complete relief can be obtained by a change in diet, without any other treatment, such an immediate result can only be expected in mild cases of short duration. In the great majority of instances, the condition is of long standing, and aperients have been used or abused until the reflex has become blunted or lost. In all cases, however, in which the motor activity of the intestines is deficient or the constipation is the result of over-dryness of the feces, considerable improvement will result from dietetic treatment. In obstinate cases, no immediate or rapid effect of diet can be anticipated, and it should be explained to patients that dietetic treatment together with other remedial means must be used for some time before beneficial results will be apparent. Hertz sums up the principles upon which a suitable dietary for constipation should be framed as being readily gathered from a consideration of the normal stimuli to intestinal activity. The mechanical stimulation of the intestinal movements depends on the direct irritant action of cellulose, and on the distention produced by the food; the latter is due mainly to the indigestibility of cellulose, which also diminishes the digestion of vegetable proteins and starch, and so adds to the bulk of the intestinal contents. The intestinal juice and bacteria, both of which are increased by vegetable food, further increase the distention of the intestines. The chief mechanical stimulants of intestinal activity are sugars, the organic acids and salts of vegetable foods, fats, the extractives of meat and the products of the digestion and bacterial decomposition of carbohydrates, fats and to a less extent of proteins.

VALUABLE DIETETIC FOOD IN CONSTIPATION.—The alterations of diet which are usually indicated are then an increase of cellulose, the ingestion of vegetable foods, especially of those which contain much cellulose, an increase of fat of organic acids and sugar, a sufficiency of water and an avoidance of astringents.

COHNHEIM'S DIET IN SPASTIC CONSTIPATION

	Calories
7 A.M. One glass of hot peppermint and valerian tea.....	
7.30 A.M. Tea with cream and a tablespoonful of milk-sugar.....	157
Fine white bread with butter and raspberry jelly.....	260
10 A.M. Kumiss or kefir two days old, one glass.....	157
White bread and.....	65
Butter.....	120
One egg.....	80
12-1 P.M. One small plate of soup.....	20
Tender vegetables cooked in butter.....	40
Meat, 100 gm.....	150
Stewed fruits.....	45
One glass of raspberry lemonade.....	174
4 P.M. Tea with cream and a tablespoonful of milk-sugar.....	157
Fine white bread with.....	65
Butter and.....	120
Raspberry jelly.....	75
6 P.M. One-fourth liter of kefir or kumiss.....	157
7-8 P.M. Tea with.....	
Cream.....	
One tablespoonful of milk-sugar.....	156
White bread.....	65
Butter and.....	120
Cold meat.....	75
9-10 P.M. Purée of fruit.....	25
TOTAL NUMBER OF CALORIES.....	2,282

Forbidden: Cabbage, coarse bread, goose, duck, and all raw fruits except sweet apples, oranges and grapes.

The following is Hertz's list of articles of diet which are of most value in the treatment of constipation: wholemeal bread; porridge made with coarse oatmeal; oatcake; vegetables twice a day, especially green vegetables of which spinach and cabbage are the best; asparagus and onions; carrots, parsnips, turnips and artichokes; tomatoes, watercress and lettuce; olives. Fruit three times a day, except bananas and bilberries, raw or cooked; especially fresh plums, greengages and peaches; raspberries, currants, gooseberries, strawberries and figs; pears, apples,

oranges, grapes and melons; dried figs, raisins, prunes, dates and ginger; jam and marmalade with bread and puddings; honey; treacle; butter with bread and vegetables; oil in salad. Olive oil is valuable in the treatment of constipation, but probably the most useful is purified petroleum oil, owing to the fact that its action is entirely mechanical and therefore it does not disagree, as the vegetable oils are apt to, if taken for any length of time. However, petroleum oil hardly comes under the head of dietetic treatment of constipation. Cream with porridge and stewed fruits, bacon fat, suet pudding and cod liver oil, are all articles of diet which serve to overcome persistent constipation. Lemonade, cider, beer, are good beverages—no claret or port. Tea, preferably China, is only allowed if freshly prepared and drunk with cream or milk, and not more than three cups a day. It may be replaced by an equivalent amount of *café au lait*, but black coffee is forbidden. Hawkins says that tea should be avoided and taking all things into consideration, experience would

DIETARY FOR CONSTIPATION (Fitch)

		Grams	Calories
<i>Breakfast</i> —8 A.M.			
Baked apple	1 large	120	128
Milk and coffee	1 cup	200	156
Butter	1 ounce	30	240
Honey	1 “	30	101
Dry toast	2 slices	100	120
<i>Lunch</i> —10 A.M.			
Buttermilk	1 large glass	300	118
<i>Dinner</i> —12 M.			
Bouillon	1 plate	200	22
Crackers	2	26	57
Mutton	2 slices	200	626
Cabbage	3 heaping tablespoons	300	15
Corn bread	Liberal helping	100	266
Plums	6 medium	200	162
Fig preserves	1 tablespoonful	100	325
White wine	10 ounces	300	207
<i>Tea</i> —3 P.M.			
Buttermilk	1 large glass	300	118
<i>Dinner</i> —7 P.M.			
Meat	2 medium slices	150	250
Butter	1 ounce	30	240
Stewed apples	4 heaping tablespoons	300	483
Graham bread	2 large slices	250	672
<i>Bed-time</i> —10 P.M.			
Lager beer	2 bottles	750	390

seem to show that he is right. Easily digestible foods are contra-indicated, also such articles of diet as rice and the like, white bread, blanch-mange and mashed potatoes. These may be replaced by stewed fruit with cream in place of rice and similar foods, wholemeal bread in place of white bread, and green vegetables in place of potatoes.

It is very important that the free use of water as a drink should be insisted upon. In addition to that taken with or immediately after meals, a glass of cold water—which is believed by Hertz and others to have a more powerful effect on intestinal peristalsis than hot water—should be drunk before breakfast, another half an hour before dinner, and a third just before going to bed.

Sour milk has a slightly stimulating action on the bowels owing to the lactic acid it contains. There is no doubt as to its inhibitory effect on the development of intestinal organisms, so that in cases of colitis associated with constipation, especially when the stools are alkaline and offensive, Hertz recommends sour milk. Hertz also goes somewhat contrary to general medical opinion in that he advocates the same diet for spastic constipation and mucous membranous colitis as for ordinary constipation.

DIETARY FOR CHRONIC CONSTIPATION (Wegele)

		Protein	Fat	Carbo- hydrates	Alcohol
<i>Morning:</i>	200 gm. milk and coffee....	3.20	4.40	3.20	
	30 " butter.....	0.21	24.50	0.15	
	30 " honey.....	0.35	0.03	17.00	
<i>Forenoon:</i>	300 " buttermilk.....	12.15	2.80	11.20	
<i>Noon:</i>	200 " bouillon.....	1.00	0.60	1.20	
	200 " mutton.....	23.20	50.50	0.70	
	200 " plums.....	0.80		11.60	
	300 " white wine or cider.			9.00	24.7
<i>Afternoon:</i>	300 " buttermilk.....	12.15	2.80	11.20	
<i>Evening:</i>	150 " meat.....	28.20	11.00	0.10	
	30 " butter.....	0.21	24.50	0.15	
	300 " stewed apples....	1.00		39.00	
	250 " graham bread	22.50	2.50	125.00	
<i>After evening meal:</i>	750 " beer.....	42.60	6.50	4.70	28.8
Total.....		147.57	133.13	234.20	53.5
Calories.....		600	1,800	1,000	375

ENTIRE NUMBER OF CALORIES3,775

The following is a diet list recommended by Hawkins in the treatment of constipation:

DIETARY IN THE TREATMENT OF CONSTIPATION (Hawkins)

Half an hour before breakfast ten fluid ounces of hot water, with a small dose of Carlsbad salt dissolved therein, insufficient to produce an obvious aperient effect; or the juice of an orange made up to ten ounces with cold water:

Breakfast:

Coffee with milk and sugar, 10 oz. or cocoa; graham or wholebread or toast, 3 oz.; porridge with cream or cream with 2 oz. of Scotch oatmeal; 1 egg (or fish or fat bacon); butter, 1 oz.; honey, $\frac{1}{2}$ oz. (or treacle or home-made marmalade); 2 apples baked or raw (or bananas, pears, and other fruit in season).

Dinner:

Bread or toast as above, 2 oz. (or wholemeal biscuits); fish, 2 oz. (or chicken or meat); French beans, 4 oz. (or Spanish onion, celery, cabbage, Brussel sprouts; salads with oil, 2 oz. (lettuce, potato, tomato, beetroot); stewed fruit with cream, 2 oz. (prunes, figs, apple, charlotte or purée); butter, $\frac{1}{2}$ oz.; lager beer, 10 oz. (or cider, Hock, Moselle, Berncastler).

Afternoon Lunch:

Coffee, milk and sugar; 8 oz.; bread, toast or wholemeal biscuits as above, 2 oz.; butter, $\frac{1}{2}$ oz.

Supper:

Clear soup, 6 oz.; otherwise same as dinner.

Bed-time:

Water plain or aerated, 10 oz.; wholemeal biscuits.

DIETARY IN ATONIC CONSTIPATION (Cohnheim)

7 A.M.

1 glass of cold water.

Breakfast—7.30 A.M.

Malt coffee or tea with milk; 1 teaspoonful of milk sugar; whole wheat bread with butter, honey or marmalade.

Forenoon Lunch—10 A.M.

Buttermilk two days old, kefir, kumiss, or sour milk; whole wheat bread; butter and ham.

Dinner—12 M.—1 P.M.

Vegetables, including cabbage, small amounts of meat, an abundance of sweet fruit juices; and 1 glass of cider sweetened with 1 tablespoonful of milk sugar.

Afternoon Lunch—4 P.M.

Malt coffee or tea with milk; whole wheat bread and butter.

Supper—7 P.M.

$\frac{1}{2}$ liter of two days old kefir or kumiss; Pilsener beer, bread and butter; eggs or cold sliced meat.

9–10 P.M.

Fruit or honey cakes; strictly forbidden—rice, gruel, sago and cereal soups.

Kemp recommends whole wheat crackers containing phytin, which is laxative, bran biscuits and biscuits containing agar agar in the dietary for constipation.

FRIEDENWALD AND RUHRÄH'S DIETARY IN CHRONIC
CONSTIPATION

	Calories
6 A.M.	
40 gm. orange juice.	80
<i>Breakfast—8 A.M.</i>	
300 gm. milk with coffee.	192
2 soft-boiled eggs.	160
150 gm. graham bread.	375
40 gm. butter.	326
<i>Forenoon Lunch—10 A.M.</i>	
400 gm. cider.	280
<i>Dinner—12 M.</i>	
200 gm. broth with 1 egg.	84
100 gm. steak.	214
100 gm. carrots.	41
100 gm. beans.	193
150 gm. graham bread.	375
200 gm. stewed apples.	106
<i>Afternoon Lunch—4 P.M.</i>	
400 gm. buttermilk.	166
<i>Supper—7 P.M.</i>	
100 gm. scraped beef.	118
150 gm. graham bread.	375
200 gm. stewed prunes.	176
300 gm. cider.	210
9 P.M.	
40 gm. figs (or 400 gm. buttermilk).	46
TOTAL NUMBER OF CALORIES.	3,517

In treating this disorder by dietetic means, one must never forget that it is essential to suit the diet to the patient and to always bear in mind the personal equation. Diets must be modified in order to be adapted to individual idiosyncrasies. (See additional dietary, Volume III, Chapter XXVIII.)

COLITIS

This condition may be due to many causes and the treatment must to some extent depend upon the cause. Nevertheless, there are certain general principles underlying the treatment of colitis, and the most important of these is to keep the bowel empty. With this object in mind, little food should be given to a patient suffering from acute colitis; for the first twenty-four hours albumin water will be enough. On the next day milk either citrated, two grains of sodium citrate to each fluid ounce

of milk, or peptonized to prevent curdling, or barley gruel, may be given in small quantities every hour. A patient with acute colitis should always remain in bed and be kept warm. According to Hale White, the British authority, acute colitis being nearly always due to a microörganism, some cases are benefited by sour milk. About a pint or a pint and a half a day, may be taken, and the milk must be properly soured by the Bulgarian bacillus.

Membranous Colitis—DIET IN MEMBRANOUS COLITIS.—This disease mostly affects women and ordinarily arises as a neurosis or from organic causes within the abdomen. Constipation is nearly always at fault. Kemp points out that gastric conditions should be determined in the case of membranous colitis. Gastropstosis and enteropstosis are considered etiological factors by some observers. Diet should be modified according to whether hyper- or hypo-acidity is present. The patient will not be cured until the constipation has been overcome, and as in other cases of colitis, a cure will not be effected unless the bowel is kept empty.

Food taken by the patient should be well masticated and the diet should be ample. The dietary should not be too restricted even if the patient is fanciful and fastidious. On the one hand, an obviously indigestible dietary should be avoided, but the patient should partake of any ordinary wholesome food served to her, of course, well cooked and attractively presented so as to tempt a capricious and slender appetite. She must eat well, even if it be an effort to do so, and must take meals at regular times, go to bed early and have eight hours of sleep. Some advise predigested food; von Noorden recommends a diet containing much bulky indigestible material, but Hale White is of the opinion that an ordinary diet succeeds as well as either, with the added advantage that it does not foster valetudinarian habits.

Mucous Colitis—DIET IN MUCOUS COLITIS.—In cases of mucous colitis resembling simple constipation, with mere excess of mucus and little or no evidence of spasm, a diet such as is recommended in constipation may be found equally suitable. An attempt should be made in all cases to diminish the use of meat and to substitute a larger allowance of fat. It is good dietetic policy to eat an abundance of fruit.

Von Noorden's diet consists of "half a pound of graham bread, all kinds of leguminous vegetables, including the husks and all vegetables containing much cellulose, fruits, especially those which have thick skins and seeds, such as currants, gooseberries and grapes, with large quantities of fat, butter and bacon." With such a diet, he reports a permanent cure in 50 per cent and incomplete success in 28 per cent.

MODIFIED CELLULOSE DIETARY (Hawkins)

Half an hour before breakfast:

8 oz. of hot water.

Breakfast:

			Calories
Milk (or cocoa made with milk).....	8 oz.	240 gm.	157
Graham or wholemeal bread or toast.....	3 "	100 "	300
Butter.....	1 "	30 "	240
Honey.....	1½ "	15 "	52
1 egg (or fat bacon).....	...	50 "	80
Baked apple (or fruit in season, pears, currants, gooseberries, blackberries, raspberries, grapes).....		150 "	112

Dinner:

Scrambled eggs (or savory omelet).		75 "	177
Bread or toast as above.....	2 "	100 "	300
Butter.....	1½ "	15 "	120
French beans (or artichokes, beetroot, parsnips, turnips, cabbage).....	4 "	120 "	26
Water, plain or aerated.....	8 "		

Afternoon Tea:

Freshly made tea with half milk.....	8 "	240 c.c.	157
Bread or toast.....	2 "	60 gm.	125
Butter.....	¼ "	15 "	120

Supper:

Milk soup, flavored with celery or turnip.....	6 "	180 "	25
Fish (sole, plaice or whiting).....	3 "	90 "	160
Vegetables as at dinner.			
Apple fritters or purée with cream (or stewed apples, prunes, figs).....		120 "	30
Bread or toast.....	2 "	60 "	125
Butter.....	1½ "	15 "	120
Water as at dinner (or whiskey diluted 6-1).....	1 "	30 "	210

Bed-time:

Water, plain or aerated.....	8 "		
Toast or wholemeal biscuit.....	2 "	60 "	125

TOTAL NUMBER OF CALORIES.....

2,761

In the more severe cases, in which pain is either continuous or runs at frequent intervals, the diet, in the author's opinion, should be modified so as to lessen the amount of residue that enters the colon. In such cases a very coarse cellulose diet will sometimes actually precipitate an attack, or at any rate is apt to increase the discomfort. Milk should be used in considerable amounts.

DIET IN MORE SEVERE TYPES OF MUCOUS COLITIS (Hawkins)

Half an hour before Breakfast:

		Grams	Calories
Hot water.....	8 oz.	240	

Breakfast:

Milk (perhaps slightly diluted).....	8 "	240	157
White bread or toast.....	3 "	100	300
Butter.....	1 "	30	240
Honey.....	1/2 "	15	52
Baked apple with cream.....		150	100

Forenoon Lunch:

Milk hot or cold	8 "	240	157
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Dinner:

Milk soup flavored with vegetables.....	8 "	240	50
Milk pudding, especially rice, tapioca or macaroni or custard.....	2 "	60	80
Bread or toast.....	2 "	60	200
Butter.....	2/3 "		160
Water, plain or aerated.....	6 "	180	

Afternoon Tea:

Freshly made tea with half milk (or cocoa).....	8 "	240	157
Bread or toast.....	1 "	60	120
Butter.....	1/3 "	20	160

Supper:

Lentil soup or milk soup.....	6 "	180	65
Fish.....	3 "	100	195
Potato purée, or potato salad with oil.....	2 "	60	120
Spinach or cauliflower.....	2 "	60	15
Milk pudding with cream, or blancmange with fruit juice.....	2 "	60	55
Bread or toast.....	1 "	60	65
Butter.....	1/3 "	20	160
Water, plain or aerated.....	6 "	180	

Bed-time:

Milk.....	6 "	180	125
Rusk.....	1 "	60	65

In cases of still greater severity, the diet must be still more simple, so that the residue entering the colon is further reduced. Milk diluted with lime water or as blancmange or flavored with coffee should be the main article of diet. Eggs lightly boiled or as custard may be taken in some cases, with carbohydrate food in the form of toast, rusks, arrow-root, rice or tapioca.

In prescribing a diet for this class of patients, the general state of nutrition must be considered. Such patients are generally ill nourished,

and continued loss of weight may at first require a simple diet of milk, carbohydrates and fat, to which articles containing much cellulose may be gradually added. A gain in weight is always a hopeful sign.

The gastric condition, hyperacidity or hypoacidity, should be treated and the diet modified to suit the existing condition. Kemp believes enteroptosis to be a factor, and advises abdominal support, preferably at first by Rose's belt.

Ulceration of the Colon—DIET IN ULCERATION OF THE COLON.—The colon may be ulcerated as a result of several diseases, *e.g.*, tuberculosis, cancer and typhoid fever, but only that form of ulceration will here be discussed which is extensive, very similar to the ulceration produced by dysentery and not due to any easily recognizable cause. Treatment of this condition is difficult. The patient must be put to bed and kept there for many weeks. Citrated milk with eggs beaten up in it forms a good diet. Three pints of milk with two eggs beaten up in each half pint may be taken in twenty-four hours. This, however, is hardly enough food, so, if possible, two feedings a day of some good infant's food may be given in addition. Soft-boiled eggs, barley and rice gruel, chicken soup, mushes, butter, cream and sour milk may be added.

DIET IN OTHER INTESTINAL DISEASES

Hemorrhoids—DIET IN HEMORRHOIDS.—While so far as is known diet plays no part in the causation of hemorrhoids, in a large number of cases diet will do much to relieve the symptoms and will often cure the patient altogether. Perhaps hemorrhoids are more frequent in persons of full habit who are gross eaters and drinkers, although they are common enough in spare energetic men leading clean and active lives. When hemorrhoids are present, and especially when inflamed, there is considerable scope for dietetic treatment.

Hawkins says the correct line of treatment is indicated by the aggravation of the trouble which inevitably results from a continuance of large meals with alcohol. A diet of such a nature should be adopted as will provoke but little gastro-intestinal congestion. If a patient of a "full habit" adopts a rigorous diet, becomes a teetotaler and keeps the bowels well regulated by mild laxatives, he will probably get rid of his troublesome complaint and enjoy better health in every respect. Meals should be small and simple; little and often should be the motto. Spices and condiments are forbidden, no alcohol is allowed, and on the whole the patient is better without tea or coffee. Some recommend that the amount of fluid taken

should be diminished, but there seems to be no particular object gained in pursuing such a course. Water should be taken at and between meals. The diet should consist largely of milk, slightly diluted or as blancmange or in weak tea, with butter, eggs, carbohydrates, as toast, milk puddings, potato and honey, raw and stewed fruit and green vegetables, such as spinach, string beans, asparagus, green salads, cauliflower, matzoon, Kummis, fermillac and buttermilk.

The following dietary has proved of value in the author's experience. It contains ample nutrient material and leaves a scanty residue:

DIETARY SUITABLE IN HEMORRHOIDS.

Breakfast:

A cup of milk flavored with cocoa; a small bowl of gruel with cream; a slice of dry toast and butter.

Dinner:

Vegetable soup enriched with milk and egg; milk pudding or egg custard with cream or stewed apples or prunes; toast with bread and butter; a glass of buttermilk.

Supper:

Vegetable soup such as potato, lentil or vegetable stock, thickened with milk; fish or egg, mashed potato and cauliflower; milk pudding or egg custard, fruit jelly or blancmange with cream.

Intestinal Colic—DIET IN INTESTINAL COLIC.—Intestinal colic (enterospasm) usually occurs as a result of constipation, enteritis or colitis, more particularly the latter in the form known as mucous colitis, or to improper diet. The dietetic treatment of this disorder, therefore, depends somewhat upon its causation. In the presence of constipation, the diet should be rich in bulky cellulose foods such as Quaker Oats, whole wheat bread, and green vegetables. The liberal consumption of fruits exerts an aperient action. The ingestion of fats such as butter and cream should be encouraged. Buttermilk, cider and malt liquors are of value. Patients having catarrh of the bowel require a bland diet containing a large amount of fat in the form of butter and cream.

Nervous Intestinal Colic—Diarrhea—DIET IN NERVOUS DIARRHEA.—

There are certain individuals in whom the entrance of food into the stomach excites an undue peristaltic action of the whole bowel resulting in diarrhea. This is an affection essentially nervous in origin. It is uncommon and may be accompanied by sudden influx of fluid into the alimentary tract with resulting profuse and copious liquid stools. There are many types of nervous diarrhea, none of which are especially influenced

by diet. The condition must be treated along general lines and frequently the patient will be the best judge of his diet.

Intestinal Stasis—DIET IN INTESTINAL STASIS.—Intestinal stasis, intestinal putrefaction and intestinal toxemia are so correlated, that in prescribing a diet, all must be taken into account. Intestinal stasis is that condition in which food, for one reason or another, remains in the intestine for a prolonged period, frequently producing intestinal putrefaction followed by toxemia. The dietetic treatment of intestinal stasis with putrefaction is fully dealt with in the section on auto-intoxication or intestinal toxemia (*see* Volume III, Chapter XXIII). Intestinal ulceration and its treatment by diet are discussed under the head of colitis. Nervous affections of the intestines are represented by atony of the large intestine, flatulence or meteorism, intestinal neurasthenia and nervous diarrhea, which has been previously considered.

The dietetic treatment of atony of the large intestine is identical with that of habitual constipation, which was fully discussed in a former part of this chapter. Flatulence or meteorism is a condition, the especial feature of which is an excessive accumulation of gas in the intestine. In its dietetic treatment, foods tending to produce large quantities of gas, such as beer, cider, carbonated waters, fruit, cabbage, rye and graham breads and potatoes should therefore be avoided. Frequently, the disorder is of purely nervous origin and when this is the case, Friedenwald and Ruhräh advise an unrestricted diet, one that will invigorate the patient's system and thereby cause the flatulence to disappear.

Intestinal Neurasthenia.—This condition somewhat closely resembles nervous dyspepsia, and is described by Kemp as a combination of the intestinal neuroses. The appetite is good and the symptoms usually appear when intestinal digestion takes place, about two or three hours after meals, in form of pressure, tension and griping pains in the abdomen. Nausea is sometimes present, and at times an evacuation of the bowels occurs accompanied by painful sensations in the abdomen and arms. Palpitation and hot or cold flushes are occasionally complained of. The patient generally feels worse when resting in the recumbent position than when walking about. The symptoms usually disappear in a couple of hours to return later after a meal. Constipation is usually present.

The most indigestible food is occasionally well borne, whereas the digestible foods produce discomfort. Borborygmi and diarrhea are sometimes present, the latter in the middle of the night or in the early morning. In every case it is essential that the diet be regulated to the patient's

digestive powers. As a rule, a liberal diet is indicated in these cases. The sour milks are of value in the dietetic régime. Indigestible substances should be avoided, and also the red meats, to lessen the nervous irritability.

SPRUE

Character of Sprue.—Strictly speaking, sprue comes under the head of tropical diseases, but as it is also a disease which especially affects the intestine, it will be discussed here. Sprue is an advanced stage of chronic tropical diarrhea. Tropical diarrhea is attended by severe symptoms of disordered digestion, malnutrition and progressive emaciation. Kemp agrees with Musgrave that mild and moderately severe cases of dysentery, in which ameba are found in the stools, often become chronic, and sprue may be the ultimate outcome.

According to Thin, the entire alimentary tract and the small intestine in particular becomes atrophied and yet, despite the general atrophy, there is a true sclerosis of the submucosa due to a development of the connective tissue, which leads to a degeneration of the glands and follicles. Thin believes the cause to be a specific poison which finds its best soil for development in the ileum. It alters the secretion of the mucosa and allows the food to retain its acidity, whence the dyspepsia, malnutrition and acid stools. It destroys the coloring matter of the bile and causes anemia.

The disease begins with psilosis linguæ, which cause discomfort in the mouth and throat and difficulty in swallowing. In its fully developed form, it gives rise to sprue or white flux. Sufferers from sprue are usually wasted and anemic, the mucosa of the alimentary canal from mouth to anus is inflamed, eroded in places and hyper-sensitive, the stomach and intestine are distended with gas, the glandular and absorbing tissues of the bowels are inflamed and possibly in part destroyed, the muscular coats are wasted, the liver small and the pancreatic and biliary ducts are catarrhal. The stools are pale, phenomenally abundant, fermenting, especially so in the morning and early forenoon. Mason and Daniels(14) say that the disease is very persistent and generally progressive and unless arrested or cured will terminate sooner or later in death from inanition, even if no secondary infection intervenes.

DIET IN SPRUE.—In no disease is it more necessary than in sprue to enforce the principles of physiological rest together with an adequate supply of digestible non-irritating food. In fact, experience has shown that drugs play an insignificant part in the management of the disease.

In patients of sound constitution, whose digestive apparatus has not been hopelessly injured, and who are under fifty, a good deal may be done by effective treatment in which diet plays the chief rôle.

Mason and Daniels are perhaps the first authorities of tropical diseases and therefore their method of dietetic treatment will be mainly referred to. The methods used may be classified thus: (a) the milk diet; (b) the meat diet; (c) the fruit diet; (d) the mixed diet.

Of these methods, the most generally applicable and effective is the *milk diet*, "all milk and only milk." It should always be given a trial in the first instance, and its success depends, to a great extent, on the strict observance of the minutest details.

The patient should be put to bed in an airy, sunny room, in which the temperature is kept uniformly above 60° F. With regard to diet, written directions are given as follows:

- (a) Fresh milk, slightly warmed, to be the only food and drink.
- (b) The milk is to be taken at intervals of two or three hours, in divided quantities up to the aggregate amount of three pints in the twenty-four hours.
- (c) The milk must never be drunk down hurriedly, but slowly sipped or sucked through a straw or fine glass tube, in imitation of the natural way of ingesting milk.
- (d) After each feeding the mouth must be rinsed out with an alkaline or antiseptic wash, and the teeth lightly brushed.
- (e) Unless the patient is very weak, sleep must not be disturbed for feeding purposes.
- (f) If at any time there is a feeling of nausea, or a want of appetite, one or more feedings should be omitted.
- (g) Throughout the treatment the patient's weight should be taken every three or four days and accurately recorded.

If there is no marked improvement after this treatment has been carefully carried out for a week, the diet must be modified. If improvement is marked, attempts to increase the amount of milk must not be made too soon. When the stools begin to become solid and the appetite improves, additions to the extent of half a pint of milk may be allowed every two or three days. When the patient takes six pints of milk daily he generally begins to gain weight and may then sit up for a few hours, carefully clothed and in a warm room. Later when he is on seven or eight pints of milk a day, he may go out of doors on fine days, without taking active exercise.

Not until six weeks after the stools are formed and the soreness of the mouth and the abdominal distention have disappeared, may any attempt be made to add to the dietary. Probably the best time to do so, is when some indication of bile has appeared in the stools. This attempt

to make additions to the dietary must be made with due caution and the quantities given at first must be small, a corresponding amount of milk being deducted and the effect on the tongue and stools carefully observed. The slightest tendency to relapse must be regarded as a danger signal, in which event a mild aperient should be administered and a milk diet alone resumed until the disturbing symptoms have subsided.

When the change of diet is borne without ill effects, the following articles of food may be gradually and carefully introduced: Fruit, especially strawberries or bananas, mashed up with a portion of milk; raw or underdone eggs; well boiled arrowroot, rice water or barley water; rusk, crisp thin toast, or pulled bread; custard, malted artificial food; stewed apple, chicken broth in which rice has been boiled and strained out; pounded chicken, chicken cream or panada; boiled sole or turbot; boiled, mashed and afterwards baked potato; thus gradually after several months reverting to regular meats and ordinary diet, but for a long time avoiding all but the simplest and most digestible foods, taking no alcohol or beef or more fluid at meals than necessary.

Weight must be taken frequently. A small weekly gain indicates that nutrition is being efficiently conducted. In these circumstances care must be taken not to overfeed.

Sometimes the milk treatment even when carried out in the most careful manner possible fails from the outset, or after this form of treatment has been conducted for some time, milk seems no longer to suit or it only agrees in limited quantities. In spite of this apparent initial failure, the milk treatment should not be abandoned without further effort. The amount may be reduced, the milk may be boiled or peptonized, diluted in water or barley water, condensed by evaporation in a shallow dish placed on boiling water, and the milk stirred to prevent the formation of scum, which, should it form, must be discarded; given as skimmed milk, kumiss, whey, buttermilk or in some form of clotted milk. It happens occasionally that the addition of a little fruit, strawberries, in particular, will succeed when milk alone may fail. In certain instances, so long as the total amount of milk consumed in the twenty-four hours does not exceed three or four pints, it is digested and absorbed, but whenever this insufficient amount is exceeded, a relapse occurs. In many such cases, the failure appears to depend on inadequate absorption of the watery element in the milk. In this event the necessary degree of absorption may be brought about by evaporating say, six pints of milk to four or three.

Recently the use of buttermilk, and of living lactic acid ferments, etc., introduced with each feeding of milk and given in other ways is strongly

advocated in the dietetic treatment of sprue and chronic dysentery. W. Carnegie Brown advocates the soured milk treatment.

Every mode of giving milk or every modification of the milk treatment should be tried before the method is finally abandoned. Should all these methods fail, recourse must be had to some other means of feeding.

MEAT DIET IN SPRUE.—When it has been decided to employ the meat treatment of sprue, it is well to commence with a teaspoonful, gradually increased to a tablespoonful dose of carefully prepared meat juice. If this seems to be borne without untoward effects, scraped meat and later minced and lightly cooked meat may be gradually introduced. When the latter is given, the meat should be reduced to a pulp and warmed by floating for five or ten minutes in a saucer placed on boiling water, the warming being repeated several times until the meat loses its raw appearance.

At first an ounce or two of meat so prepared should be given every three or four hours, but if it agrees the quantity should be gradually increased and the intervals between the meals lengthened, until a pound or more is consumed in three or four meals during the twenty-four hours.

Very dry, thin crisp toast may be added to these meals but water should not be drunk until at least two hours after the meal. The water should be given as hot as it can be swallowed and sipped slowly.

After several days or weeks of this diet it may be suspended temporarily and an attempt made to resume the milk or mixed diet; but a few hours should be allowed to intervene between the abandonment of the one and the introduction of the other.

As much care must be exercised in a return to normal diet after a course of meat treatment, as after the milk treatment.

FRUIT DIET IN SPRUE.—Strawberries have been introduced recently in the treatment of sprue in conjunction with the milk treatment. According to Mason and Daniels, a diet of milk and strawberries, the amounts of both being gradually raised to six pints of the former and three pounds of the latter, constitutes on the whole the most generally successful treatment of sprue, sometimes apparently leading to a rapid and permanent cure. A substitute for strawberries, when this fruit is not obtainable in good condition, is the banana. Only ripe fruit should be used, reduced to a pulp and thoroughly blended with the milk. In Java, where sprue is endemic and manifests itself in a particularly virulent form, a diet of fruit alone is sometimes employed and it is claimed with success. In Europe, the grape cure is occasionally practised.

In the Javanese fruit treatment, most fruits including bottled fruits

are allowed, the most acid fruits are permitted, and all other food is prohibited until every symptom of the disease has disappeared, or the treatment has proved manifestly unsuitable. Mason and Daniels have had no experience with this seemingly heroic method, but van der Burgh and others vouch for its efficacy in a number of cases that had resisted other modes of treatment.

REFERENCES

1. CAMMIDGE, P. J. (London). *Am. Med.*, June, 1916.
2. SPRIGGS. *Quart. J. Med.*, 1908-9.
3. PRITCHARD, ERIC (London). "Special Acidosis Number," *Am. Med.*, June, 1916.
4. LANGMEAD. *Am. Med.*, June, 1916.
5. KEMP, ROBERT COLEMAN. *Am. Med.*, June, 1916.
6. KERLEY, CHARLES GILMORE. *The Practice of Pediatrics.*
7. OCHSNER. *Med. News*, May 2, 1903.
8. KEMP, ROBERT COLEMAN. *Diseases of the Stomach, Intestines and Pancreas.* 3rd ed., W. B. Saunders Co., 1917.
9. PORTER, W. H. *Post Grad.*, October, 1902.
10. KEMP, ROBERT COLEMAN. *Diseases of the Stomach, Intestines and Pancreas.* 3rd ed., W. B. Saunders Co., 1917.
11. DANIELS. *Index of Treatment*, Latham and English.
12. BRUNTON, LAUDER. *Sutherland's Diet and Dietetics.*
13. HERTZ. *Index of Treatment*, Latham and English.
14. MASON AND DANIELS. *Sutherland's System of Diet and Dietetics.*

CHAPTER IV

DIET IN DISEASES OF THE LIVER

JOHN W. TORBETT, B. S., M. D.

General Considerations.

Diseases of the Liver: Abscess of the Liver; Acute Yellow Atrophy of Liver; Amyloid or Lardaceous Disease of the Liver; Cholelithiasis; Biliousness; Catarrhal Cholecystitis; Cirrhosis of the Liver; Chill of the Liver; Congestion of the Liver; Fatty Liver; Tropical Hepatitis, Hepatic Abscess; Jaundice; Torpor of the Liver; Visceroptosis.

GENERAL CONSIDERATIONS

There is one thing we have noticed for years in the dieting of all liver troubles, as recently pointed out by Goldthwaite of Boston, namely, that all persons belong to one of two classes, the same as animals, the *carnivorous or wolf type*, and the *vegetarian or ox type*. The former can digest or assimilate a higher protein dietary, and in fact require it, while the latter, who have broader vertebrae, high cheeks and broad jaws and a longer alimentary canal, must live on a meatless low protein dietary. These temperamental peculiarities should be observed and the past dietetic habits always inquired into and duly considered.

DISEASES OF THE LIVER

Abscess of the Liver—DIET IN ABSCESS OF THE LIVER.—The dietetic treatment of abscess of the liver corresponds closely to that of syphilis of the liver, which will be discussed later. Care must be taken not to overtax the digestive organs by giving too much food at one time. Assimilable and predigested food in small quantities, at frequent intervals, at least once in three hours, should be given. Milk and eggs in various forms and combinations should comprise the larger portion of the aliment, and animal broths or light vegetable purées may also be employed. Solid food is prohibited, with the exception of such articles as white fish, sole

or haddock, a few oysters, sweetbreads and milk toast. Fats of any kind are on the interdicted list. Malt liquors, port, sherry and strong alcohol in any form are strictly forbidden. Gilman Thompson thinks that if any stimulant is required, a little hock, Moselle or champagne may be taken, or brandy freely diluted with Apollinaris or Vichy. In the opinion of the majority of authorities alcohol of any description is contra-indicated in the treatment of abscess of the liver.

Acute Yellow Atrophy of the Liver.—Acute fatty degeneration of the liver occurs both as a primary disease and secondary to other hepatic disorders, or as a symptom of constitutional disease. Primary acute atrophy of the liver is a very rare but extremely severe and almost invariably rapidly fatal disease. Females, according to Strümpell, are much more liable to the disease than males; and pregnancy increases the predisposition. H. D. Rolleston(1) says that acute yellow atrophy of the liver is now known to be not invariably fatal.

In cases of jaundice with the possible sequela of acute yellow atrophy of the liver, the prompt observance of prophylactic measures is most important. In the case of pregnant women suffering from catarrhal jaundice associated with toxic symptoms, including great drowsiness; and in syphilitics in the secondary stage affected with jaundice, efforts to decrease the toxemia should be made.

Diet in Yellow Atrophy of the Liver.—The diet should be limited to milk and carbohydrates, the patient meanwhile being confined to bed for a time, in a thoroughly aired room. In order to vary the monotony of the milk diet, coffee, tea or cocoa may be used to flavor it, and corn flour to thicken it. A daily quantity of three or four pints may be used. If the patient suffers from indigestion, the substitution of peptonized milk gruel in part or entirely may be made for the plain milk. To prevent acidosis, sugar and chocolate are of value. The ingestion of generous quantities of water for the purpose of diluting the toxins and increasing the excretions, is important. Of marked value are the alkaline mineral waters of which Vichy is a notable example.

Amyloid or Lardaceous Disease of the Liver—DIET IN AMYLOID DISEASE OF THE LIVER.—This disease, like fatty change, is a local manifestation of a general cause. It is due to syphilis or prolonged suppuration, such as a psoas abscess or a chronic empyema, and in rare instances to other cachexias. When the condition has been diagnosed, it is usually too late to stay its course by dietetic or other means of treatment. The general health should be improved by residence at the seaside, open air, good nourishing food and hygienic surroundings. The dietary should be

such as not to put much strain on the digestive organs. In advanced cases peptonized milk or meat ought to be given. If digestion in the stomach is fairly active, nitrogenous food agrees, as a rule, better than the carbohydrates.

Cholelithiasis.—The factors responsible for cholelithiasis are inflammation of the gall bladder and stagnation of bile. Naunyn is of the opinion that bacterial infection of the gall bladder is the essential factor, stagnation of bile being important only in so far as it favors infection; but more recently Aschoff and Baemeister have brought forward evidence to show that stagnation of bile in the gall bladder without inflammation may give rise to the formation of single pure cholesterol calculi.

Bramson has promulgated the view that the precipitation of lime is due to an excess of this substance in the diet, but this view is not supported by experiments on animals. But, as Tibbles points out, cholesterin and lime salts normal to the bile are held in solution by taurocholate and glycocholate of soda; and it is probable that precipitation of both substances may arise from a deficiency of these salts. Although gall stones may form around nuclei, the introduction of foreign bodies into the gall bladder shows that it is improbable that this is the common origin. Most commonly the ultimate cause is catarrh of the mucous membrane of the bile passage set up by bacteria or some change in the chemical composition of the bile. The formation of gall stones is favored by age, sex, fashion of dress, luxurious living, gout, obesity and alcohol.

DIET IN CHOLELITHIASIS.—The prophylactic treatment of gall stones is concerned largely with the prevention of cholecystitis and the stagnation of bile. Hale-White knows of no article of diet which has any influence upon the formation of gall stones or upon their absorption, but he thinks it stands to reason that patients eating food too rich or in too large quantities should be advised to take plain, ordinary food in restricted quantities. However minute a gall stone may be when first formed, stagnation of bile will favor its increase in size. Food taken into the stomach leads to a flow of bile, and consequently patients liable to gall stones should not go long without meals; at least four meals a day should be taken and these at regular intervals. Breakfast should be eaten early and should be abundant, because bile has had the opportunity to stagnate during the night.

Although the patient need not be restricted to any particular kind of food, there are a few dietetic points to be emphasized. All excesses in eating or drinking must be avoided. Food should be plentiful. A

similar dietary to that of catarrh of the stomach or bowels is, on the whole, best for gall stones. The consumption of a good deal of animal food is needed to induce the secretion of bile and thus to prevent or to counteract biliary stasis. While meat is recommended as favoring a free flow of bile and preventing stagnation, the meat must be of such a nature as not to bring about indigestion. Pork, veal, sausages, hashed meat, duck, goose, high game, herrings, mackerel, salmon, lobster, crabs, mussels, etc., are prohibited. The development of alimentary toxemia must be avoided as far as possible so that the liver is not given extra work in the destruction of these toxins.

FATS IN CHOLELITHIASIS.—Fats of all kinds are usually forbidden, without direct evidence to show that all fats should be omitted. Burney Yeo(2) thinks that the excretion of an excessive amount of cholesterin appears to be dependent, to some extent, on an excessive consumption of fats, and gives this as a reason for cutting down the supply. Binet(3), on the other hand, sees no need for decreasing the supply of fat, except in jaundice or where there is a very insufficient supply of bile, the greater part of the consumed fat being absorbed by the chyle vessels, without passing through the liver. Binet, therefore, does not consider a certain amount of fat as contra-indicated, but forbids fat when the liver is shown to be overtaxed. He agrees with Hale-White that only fats of low fusion point should be allowed, such as butter and cream, and these must be fresh and free from the taint of rancidity. In fact, there are many cases in which the value of fat is plainly evident, and in such cases there is frequently a coexistent hyperchlorhydria. Furthermore, the laxative effects of fat should serve a useful purpose. Olive oil is often prescribed, and there is much divergence of opinion as to its action. It certainly is digested better than fat meat, but not so well as cream or butter. Hale-White points out that a gall stone placed in olive oil at the temperature of the body slowly loses weight, because cholesterin, the chief constituent of gall stones, is soluble in olive oil. The oleic acid, of which olive oil contains 72 per cent, is the chief agent in effecting this solution, and it is suggested that when olive oil is taken by the mouth, the oleic acid is excreted by the liver or the mucous membrane of the biliary passages, and so slowly diminishes the size of the gall stone. To some extent also the expulsion of the stone may be aided, because the intestinal peristalsis set up by the oil extends to the bile ducts. From two to eight fluid ounces of the oil should be taken daily. It is best taken after meals. For those to whom oil is disagreeable or even repugnant, or who possess idiosyncrasies against oil, perhaps

the best method of taking it is to add a few grains of menthol and a little brandy to each eight ounces of oil. Some of it may be mashed up with potatoes, salad or fish. Pure oil should be used, and if it causes so much nausea that it is impossible to take it, seven grains of oleic acid, best prescribed in capsules, may be given two or three times a day. Hale-White is of the opinion that unless patients with gall stones suffer from jaundice, it is difficult to understand why they should not take fats as easily as in health. It seems as if Hale-White's argument is sound, that if jaundice is absent there is no special reason to avoid fats.

We believe that the administration of fats should not be permitted except in the chronic stage of cholelithiasis, and when every trace of local or general infection after an acute inflammatory attack has passed off. In suitable cases, 60 to 100 grams of butter or 200 to 300 grams of cream in twenty-four hours are prescribed, one-third of the amount to be taken three times a day at the end of the meal. The evening dose in our opinion secures a better flow of bile during the following night.

CARBOHYDRATES IN CHOLELITHIASIS.—The carbohydrates may generally be taken in moderation. There is no cause for stinting the consumption of carbohydrates, particularly bread and potatoes, but any bacon, meat and tea, which may favor duodenal and biliary catarrh, should be forbidden. Cane sugar, because of its tendency to fermentation, leading to catarrh of the gastro-intestinal mucous membrane, should be eaten sparingly. All sweet dishes must be regarded with suspicion, and jam, marmalade and treacle should be partaken of moderately, if at all. It is said that golden syrup and substances containing maltose, dextrose and dextrin, while equally nourishing, are less injurious. Of course, pickles, spices, condiments and highly seasoned foods are on the condemned list. Very sweet fruits and vegetables must be avoided, but potatoes, cauliflower, cabbage, spinach, vegetable marrow, string or snap beans, lettuce, watercress, tomatoes, dandelion, endive, seakale, asparagus, artichokes and other vegetables which are not excessively sweet may be eaten. Turnips should be taken only in the form of purée, while peas, beans, lentils and carrots should be forbidden, because they contain phytosterin, a vegetable form of cholesterolin. Indigestible fruits and nuts must be avoided, especially those nuts which contain much fat. Fresh pecans and English walnuts in moderation are better than meats for many cases, especially those with arteriosclerosis or nephritis(4).

MEAT IN CHOLELITHIASIS.—There is some difference of opinion with regard to the consumption of animal food. Thenard considers that

a deficiency in the alkalinity of the bile is due to a too exclusive use of meat, and as the precipitation of cholesterin is favored by such deficiency, he argues that meat should not be eaten. But it has been shown previously that the secretion of bile is favored by the ingestion of an abundant supply of animal food, therefore it may be concluded that, provided too much fat is not eaten, a diet in which there is a goodly proportion of meat is the most suitable dietetic treatment for gall stones.

BEVERAGES IN CHOLELITHIASIS.—Plenty of water and other fluids should be drunk. When little fluid is taken, the bile tends to inspissate and stagnate, favoring the formation of gall stones. The beverages may consist of tea, coffee, cocoa made from the nibs, buttermilk, whey, plain water, the alkaline waters and plain or aerated distilled water.

LOW PROTEIN DIET IN CHOLELITHIASIS.—Agreeing with Chittenden that the high protein diet in common use is one of the most potent factors, directly or indirectly, in causing many chronic diseases, the sane and safe thing to do is to adopt Chittenden's low protein standard as a preventive and curative agent. By this dietary the liver will not be overworked and exhausted, but it will have more energy and strength left to eliminate bacterial and other toxins from the system. The thyroid gland, not being overworked and exhausted, will be better able to assist the antitoxic function of the liver and to antagonize the adrenal secretion which is one of the causes of high blood pressure. Physical endurance and resistance against disease will be increased and better health maintained.

Dietary Suitable for Cholelithiasis.—A dietary suitable for cholelithiasis may be selected from the foodstuffs listed below. Individuals suffering from disorders of the liver and with impaired secretion of the thyroid gland cannot digest nor assimilate large amounts of protein.

Lean Meat.—Beefsteak, undercut of beef, sirloin of beef, shoulder or leg of mutton, tongue, lean ham.

Fish.—All kinds which contain not more than 2 per cent of fat.

Poultry.—Boiled fowl, chicken, capon; pheasant, partridge and other game, unless very high.

Soup.—Clear soup, free from fat, vegetable soup, milk soup, bone soup, free from fat and thickening.

Jelly.—Plain and unsweetened savory jelly, and other jellies which are sweetened with saccharin.

Eggs.—One whole egg daily. The restriction of eggs applies to the yolk only, as the white is free from cholesterin and fat.

Fat.—Butter up to one ounce daily in ordinary cases, more being

allowed if there is hyperchlorhydria. Milk and cream are allowed in small quantities. The amount of cream usually taken in tea or coffee is permissible; but an excess of cream in trifles, "creams," or cream with fruit would be injurious. The total amount of "whole" milk consumed should not exceed half a pint daily, provided that enough nitrogenous food can be taken in other forms. Skim milk is less injurious than whole milk because of its freedom from fat. The Bulgarian sour milk is especially suitable to patients with constipation and coated tongues.

Farinaceous Foods.—Bread, wholemeal bread, dry toast, rusks, zwieback, crackers, oatmeal, barley, rye meal, buckwheat, arrowroot, sago, rice, tapioca, semolina, macaroni, vermicelli, noodles, spaghetti.

The following alimentation is suitable for a case of gall stones in a middle-aged woman inclined to stoutness:

DIETARY SUITABLE IN CHOLELITHIASIS, MIDDLE-AGED WOMAN

7 A.M.		Calories
	A tumberful of imitation Carlsbad water, formula for which is given below.	
<i>Breakfast</i> —8 A.M.		
	A cup of tea without sugar; 1 portion of fish, ham and egg or tongue; 2 slices of toast or a roll with butter; no jam or marmalade.....	
		550
<i>Lunch</i> —11 A.M.		
	Glass of Vichy water.	
<i>Dinner</i> —1 P.M.		
	Portion of fish or breast of chicken; stewed fruit purée or bread and cheese.....	
		309
<i>Tea</i> —4 P.M.		
	Cup of tea with a little sugar; thin slice of bread and butter; no sweet cakes.....	
		280
<i>Supper</i> —7 P.M.		
	Clear consommé; white fish or a well done piece of roast; no rich sauces or gravies; a slice of toast with butter; egg custard or blancmange; no salads and no nuts or sweets.....	
		484
10 P.M.		
	A tumblerful of hot water.	
		<hr/> 1,623

CARLSBAD CURE IN CHOLELITHIASIS.—Many sufferers from gall stones are benefited by a visit to Carlsbad and by drinking, before breakfast, the hot mineral water, the chief constituent of which is sodium sulphate. It is supposed to aid the expulsion of the stone by increasing the peristaltic action of the bile duct and duodenum.

ARTIFICIAL CARLSBAD WATER.—A close imitation of Carlsbad water is made by dissolving 22 grams of sodium sulphate, 12 grams of sodium

bicarbonate, and 10 grams of sodium chlorid in a pint of water. Twelve fluid ounces of warm Carlsbad water should be drunk before breakfast, 3 ounces each quarter of an hour.

Biliousness.—Biliousness is a functional disorder of the liver, in which "the digestive apparatus is on a strike," usually accompanied by an oversecretion of bile. The condition is characterized by headache, vertigo, nausea, vomiting, *muscæ volitantes*, constipation, a furred tongue, anorexia, offensive breath and malaise. Certain persons may be said to possess a bilious diathesis, being easily upset by rich foods or by overeating; their complexions are sallow, yellowish, or pasty. The exciting cause of a bilious attack is overeating or eating rich, greasy or badly cooked food. In young people it is a successful effort of nature to relieve itself. In older persons, however, continued disregard of the danger signals given by bilious attacks is apt in course of time to lead to serious trouble, as habitual lithemia, and in some cases gout. According to Gilman Thompson it is possible that diabetes may be placed in the same category. Those who have the bilious diathesis, often inherited, frequently exhibit idiosyncrasies with respect to certain articles of diet, the eating of which, even in small quantities, may bring about a bilious attack.

DIET IN BILIOUSNESS.—The essentials of treatment are that the liver should be taxed as little as possible, and for this reason a non-stimulating diet is indicated. A few foods have been credited with a special stimulating effect, although it must be confessed that their influence, if it exists, is slight. These are mainly the succulent vegetables, like tomatoes, also spinach and cress. Strong alcoholic beverages and condiments naturally have a marked stimulating effect on the liver and should be forbidden. Fats and sugars do not suit bilious persons, especially during the hot weather. Coffee and tea may be taken in moderation. Cirrhosis of the liver is initiated by continued dyspepsia which is produced largely by alcohol. It is denied nowadays by many authorities that alcohol exerts directly the pathological effect on the liver which has been ascribed to it. But, indirectly, alcohol is an important factor in the production of cirrhosis by its irritating action on the lining of the alimentary tract, resulting in catarrh and dyspepsia.

Neglect to treat biliousness by dietetic measures may induce dyspepsia and thus throw upon the liver the extra work which is the beginning of hepatic disease, especially cirrhosis. Prohibited articles are condiments, spices, curries, pickles, sauces, rich soups, fried food of every kind, veal, pork, sausages; salt foods, shellfish, new bread, pre-

serves and most kinds of sweets, most of the heavy starchy vegetables, and oily fishes. Fresh food only should be given. Especially must care be taken not to overeat. (*See* also dietary, Volume III, Chapter XXVIII, p. 803.)

The way in which food is taken is very important. Food should be eaten slowly and masticated thoroughly. It is not advisable to eat immediately after violent exercise or fatigue. The meal is best preceded by a rest, and if dyspepsia is present, a rest after meals is advantageous. Business men and women are advised to eat sparingly in the middle of the day, but noon is perhaps the best time for the principal meal for persons having the necessary time at their disposal.

Individuals subject to bilious attacks should avoid all dietetic excesses, all alcoholic beverages, all greasy or very acid foods. Corn bread, or whole wheat bread, buttermilk and spinach, lettuce or other green vegetables make a suitable diet. The patient should exercise freely in the open air; golf, tennis and horseback riding are especially useful. Late hours should be avoided.

Catarrhal Cholecystitis.—Catarrhal cholecystitis, or “chronic catarrh of the gall bladder without jaundice,” forms a distinct and definite disease. In chronic catarrh of the gall bladder regular exercise, massage over the hepatic region, the avoidance of anything tight around the waist, the judicious employment of saline aperients, and last, but not least, careful regulation of the diet, should be adopted in all cases. Overeating and -drinking must be strictly guarded against and the dietetic régime generally advised in the treatment of cholelithiasis should be followed.

Cirrhosis of the Liver—DIET IN HEPATIC CIRRHOSIS.—The most frequent form of cirrhosis of the liver is that known as *portal or multilobular*, and is the final result of the repeated occurrence of small areas of necrosis of the liver cells produced by toxins entering by the portal vein. The toxins are absorbed by the alimentary canal and are mainly the result of indigestion, most commonly of alcoholic origin. The diet must be carefully regulated, avoiding highly spiced foods and condiments, such as curries. Alcohol in all forms, and even medicinal tinctures, should be forbidden.

In a patient suffering from dyspepsia, whose liver is found to be enlarged, but who otherwise has no symptoms of cirrhosis, a careful and restricted diet may be supplemented with advantage by a course of spa treatment. At this stage of the disease, and after but a single attack of hematemesis, a carefully selected diet, complete abstinence from

alcoholic stimulants and freedom from dyspepsia, may be followed by an arrest of the symptoms and the patient may remain well, or at least seem to be well. Moreover, if he continues this careful mode of living, the symptoms may not return. However, he must be cautioned that he is not cured and his condition is only compensated for, and if he deviate from the rule of strict moderation he is running great risks. Nevertheless, even then gastro-intestinal hemorrhage may recur with little or no warning, with the possible exception of a feeling of faintness and nausea.

The treatment of cirrhosis is largely dependent upon the findings of those who have investigated the metabolism of nitrogen. For instance, Harley and Labadie-Legran found that the variations in the excretion of urea hinge more on the general nutrition than on the condition of the tissues of the liver. Favitski of Petrograd found that the nitrogen metabolism in persons with cirrhosis of the liver is much the same as that of healthy individuals. On a mixed diet the assimilation was 84 to 94 per cent, and therefore not quite normal, and the quantity of urea varied from 14 to 45 grams daily, the usual quantity being from 25 to 35 grams. The excretion of uric acid was in most cases parallel with the variation in the urea. On the whole, from these findings, the deduction may be made that the quantity of nitrogenous foods should not be reduced. On the other hand, such foods should be of a light and easily digestible character, overeating should be avoided and the diet should not be stimulating. It must be remembered that cirrhosis is almost invariably associated with gastro-intestinal catarrh, and it is principally on this account that the kind and quantity of nitrogenous foods must be carefully studied. Dyspepsia tends to increase the cirrhotic condition, and the main object of treatment is to alleviate the dyspeptic symptoms as far as may be. Milk is indicated in these cases, for it not only contains protein, but it is bland and non-irritating to the alimentary tract, making it an excellent, nearly an essential, form of diet in certain phases of the disease. In the ordinary course of events, a diet wholly of milk is unnecessary; indeed, when cirrhosis is not greatly advanced, such a diet, from its very monotony, would do more harm than good. Eggs are well digested and may be taken as custard, boiled or poached. Mutton, tender beef, chicken, tongue, tripe and the lighter kinds of fish may be eaten.

The consumption of these proteins should be watched, because of the tendency to progressive emaciation. Thirty-four grams of protein daily is the minimum necessary to maintain the nitrogen balance in

equilibrium, provided that enough energy-producing food is consumed and assimilated. The amount of protein, however, should not sink below 60 grams daily for an adult; and even with this quantity the body must continue to waste unless the caloric value of the food assimilated is equivalent to the expenditure, which is never less than 1,600 calories unless the patient is absolutely at rest in bed. The state of the digestive organs must be considered, or rather the fact that the digestive organs are unable to work properly when catarrh of the alimentary tract is present. In addition to the catarrh, the circulation is disturbed by portal congestion, and absorption is thereby considerably delayed.

According to Schwarz, the surface available for absorption is reduced by as much as one-half through catarrh and atrophy of the mucous membrane, owing to periphlebitis of the portal system, chronic peritonitis, stagnation of the ingesta, fermentation and auto-intoxication. Thus everything points to the need for the food being capable of speedy conversion and absorption. For these reasons the food should be highly nutritious, small in bulk, non-irritating, and leaving but little residue in the alimentary canal. Accordingly, Schwarz advises that whenever the case assumes a serious aspect a rigid milk diet should be given a trial. He points out that even the degenerative processes are not necessarily progressive, and by excluding further injury, permanent benefit may be obtained. When hematemesis occurs it should be treated by rest in bed for four or five days. Rolleston insists that nothing, not even water, should be given by the mouth for two days. As a rule, it is unnecessary to give nutrient enemas during this short period, but an enema of a pint of water should be given three or four times daily to relieve thirst. On the third day, provided there has been no recurrence, feeding by the mouth may be started with peptonized milk, peptonized milk gruel, and gradually increased. For a week or so, milk up to four pints a day should be taken; it can be flavored with coffee or tea, or given in the form of junket in Benger's food. The aftertreatment is of importance, for it is often only after an attack of hematemesis that the existence of cirrhosis is suspected and that the patient can be sufficiently impressed with the need for temperance. As the patient improves, the dietary should be extended; soft and easily digested fish, pounded fish and rice, eggs lightly boiled, minced chicken, mashed potatoes, butter and stale bread, milk puddings and vegetable soups may be given.

With regard to starch and fat, opinions differ as to whether or not their use is advisable in cases of ordinary cirrhosis. The consensus of

opinion of most authorities is that starchy foods require exclusion only when the digestive power is very feeble; and even then the digestion can be assisted by the use of diastase, malt extract, taka-diastase, and so on. Dextrinized or pancreatized starch in the form of the various prepared foods sold for invalids and infants may be given. But the absorption will not be increased by the employment of such foods. This deficient absorption is due to the intestinal catarrh, which is very rebellious and intractable in the vast majority of cases. The assimilation of carbohydrates and proteins must, therefore, fail sooner or later. So long as a cirrhotic subject can take carbohydrates and absorb them they should be allowed. When the power of absorption fails, they must be prohibited, for they undergo bacterial fermentation in the alimentary canal and will cause symptoms, adding to his discomfort.

With reference to the supply of fat, there is no need to reduce it while it is saponified and absorbed, which will be the case so long as the secretion of bile and pancreatic fluid is adequate. The small biliary ducts are not of necessity affected in ordinary cirrhosis; the bile is not usually retained and there is little or no jaundice. In the later stages the mucous membrane of the bile ducts becomes thickened, the channels are narrowed on account of the catarrh, and the flow of bile is hindered to a great extent.

The presence of bile is not considered by Mayo Robson and others as essential to the absorption of fat. Only about half of the absorbed fat goes through the liver, the remainder passing through the lymphatics to the systemic circulation. Consequently, there is no reason to forbid fat, but it should be prescribed only in forms which are most easily absorbed. Milk, cream, butter, cream cheese, cod liver oil and fish liver are better sources of fat than fat meat and fat fish. Patients should not eat foods cooked in fat or any articles in which lard, margarin or fats of this kind are used, because in these forms it is less readily absorbed.

In the hypertrophic form of cirrhosis the small bile ducts are involved and become blocked by accumulated secretions. The selection of fats is here a still more important point, because of the general belief that absorption is influenced by deficiency of bile. Though this point is not settled, it is the usual practice to cut down the supply of fats on account of the supposed lack of absorption.

Rolleston says that the dietary should be more generous in hypertrophic cirrhosis than in portal cirrhosis. Certain vegetables and fruits may be allowed to a limited extent in both varieties of the disease, but

the intestinal catarrh is the condition to be considered. Spinach, cauliflower, French or string beans, vegetable marrow, boiled lettuce and boiled beet leaves, tomatoes, rhubarb, cooked apples, stewed pears, cooked figs and prunes may be allowed.

When *diarrhea* is present in a marked degree, dietetic treatment for diarrhea is indicated.

When *ascites* is present, salt must be restricted in amount and possibly a salt-free diet given for a few weeks. Milk and milk and eggs are very useful at this stage and have the effect of expelling a large quantity of fluid from the swollen abdomen. The diuretic action of lactose and the nutrition of chlorids is also helpful in this respect. It is sometimes advisable to dilute milk. Buttermilk, whey, barley water, oatmeal water and various alkaline waters are serviceable, but the drinking of large quantities of diuretic waters and beverages, alone, appears to be absolutely of no avail against the ascites.

The question is frequently asked: "*What beverages should be permitted to a cirrhotic patient?*" The answer is an unqualified one so far as alcoholic drinks are concerned. By strictly forbidding alcohol the life of the patient may be lengthened considerably. In the early stages of the disease its progress may be arrested by banning alcohol. Tea and coffee should be taken in moderation, and all beverages which have the tendency to irritate the lining of the alimentary tract should be omitted, or used with the greatest moderation. The patient may drink three or four pints daily of the aerated alkaline waters, but little else. The alkaline carbonates help to thin the thickened secretion of the gastro-intestinal mucosa, to propel the mucus, and to cleanse the surface of the membrane, thereby assisting the process of absorption and assimilation. The alkaline sulphates are valuable by relieving the portal congestion.

The dietetic treatment in the early stages of cirrhosis of the liver should be principally lacto-vegetarian. It is good practice to keep the bowels open by the judicious administration of salines. The alimentation varies with the complications, more especially ascites.

The following dietary is one the author has found appropriate—No. 1, early stages of the disease, and No. 2, the later stages associated with ascites. The diet should be one in which milk forms the basis of the alimentation. Circumstances may arise which make it necessary for the milk to be diluted or peptonized in the form of skim milk or kumiss, depending upon the degree of the derangement of gastric digestion.

DIETARY NO. I—EARLY STAGES OF CIRRHOSIS,

	Calories
6 A.M. Good fresh buttermilk—10 oz.....	120
8 A.M. Whole milk—10 oz. with white of one egg and a slice of toast.....	280
11 A.M. Chicken or veal jelly or consommé, thickened with sago, farina or barley.....	172
1 P.M. Beef tea, 10 oz., thickened with meat juice, served with a dry roll; or pounded fish or fish soufflé.....	172
4 P.M. Whole milk—10 oz.....	202
6 P.M. 8 oz. beef tea with white of two eggs.....	72
9 P.M. 8 oz. of Horlick's Malted Milk.....	195
TOTAL CALORIES.....	1,213

The patient can be kept on this dietary from a week to ten days, in which time the portal congestion will be greatly relieved and a healthier state of the whole digestive tract induced. At the end of this time the diet can be gradually extended.

In accordance with the principles previously laid down in this chapter, a dry diet, such as the following, is to be recommended:

DIETARY NO. II—CIRRHOSIS OF THE LIVER WITH PRONOUNCED ASCITES

	Calories
<i>Breakfast</i> —8 A.M.	
Cup of tea; sandwich of potted chicken or raw meat, or fish or a slightly poached egg.....	225
<i>Lunch</i> —11 A.M.	
6 oz. of meat soup thickened with farina.....	105
<i>Dinner</i> —1.30 P.M.	
A portion of any white fish; pounded chicken or scraped steak or minced meat with toast; small glass of alkaline water; glass of malt extract...	339
<i>Tea</i> —4.30 P.M.	
Cup of buttermilk or freshly made tea with milk; dry sponge cake.....	186
<i>Supper</i> —7 P.M.	
Any invalid food or light pudding; glass of malt extract.....	313
TOTAL CALORIES.....	1,168

Chill of the Liver—DIET IN LIVER CHILL.—The treatment of a liver chill consists of rest in bed and of the diet appropriate to such a condition. The food must be of a non-stimulating and non-irritating character. Milk is the food least irritating to the alimentary canal, and therefore milk should form the staple of the diet in treating a chilled liver. Large quantities of liquid should be useful by rendering the bile more fluid, and the salts of sodium should likewise encourage a flow of bile. The

milk, therefore, with advantage may be diluted with White Rock or Apollinaris water, or ordinary soda water. A little boiled white fish is permissible, together with cabbage, cauliflower, spinach, vegetable marrow or French beans. Milk and bread and butter puddings and weak tea are allowable, but until the congestion has been relieved the food should be restricted in quantity. Tibbles says that it should be reduced to the physiological minimum, 1,500 or 1,600 calories, for at least two days, the diet to include not less than two pints of milk. If more food be required, a jelly made of agar-agar flavored with fruit juice or eaten with a little cooked fruit may be taken. Such fruits as strawberries, raspberries, gooseberries or baked apples in small quantities may be eaten, but bananas and potatoes and all fruits or vegetables which contain much starch should be avoided. Gelatin and jelly made therefrom, calf's-foot jelly and jelly tablets should not be allowed.

Congestion of the Liver—DIET IN CONGESTION OF THE LIVER.—Over-indulgence in eating and drinking, overuse of condiments, spices or alcohol must be forbidden, and the diet must be plain and spare. Alcohol in particular should be restricted in amount or entirely withheld.

It is advisable that the amount of protein should be reduced, for some time at any rate, to the physiological requirements and in no case should it exceed 70 to 80 grams a day, until the liver has at least approached the normal condition. Fatty foods should be avoided, because they tend to aggravate the general catarrhal condition of the alimentary organs. However, as the greater proportion of fat reaches the circulation through the lymphatics, and not through the liver, there is no reason for reducing the amount of fat below 100 grams daily, and it should be taken in the form of butter, cream and fat meat. Carbohydrates should be given in the form of bread, milk puddings and fruit; the amount should be reduced to 240 or 280 grams. With 70 or 80 grams of protein and 100 grams of fat the diet will yield a total of 2,000 to 2,200 calories a day. Alcohol in the vast majority of cases is contra-indicated—but if taken at all, it should be in very limited quantities and in the form of light wines. Malt liquors and spirits should be strictly forbidden. Exercise in the open air is essential to recovery. Walking is one of the best modes of exercise. Exercise is absolutely necessary to effect a cure, as the importance of the muscles for destroying uric acid and other waste products has been established.

The *hyperemia due to passive congestion arising from diseases of the thoracic viscera* will be considered under the head of Diseases of the Heart.

Fatty Liver.—Fatty liver is not, as a rule, a distinct entity. Rolleston says that there are no special symptoms referable to fatty liver apart from those due to the causal disease. An excessive quantity of fat is present in the liver in a large number of conditions, such as obesity and some cases of cirrhosis; also to some extent in alcoholism, poisoning by arsenic, phosphorus and iodoform, and in infective conditions, such as gastro-enteritis and pulmonary tuberculosis. Tibbles, who admits that fatty liver is seldom a distinct and separate object of medical treatment, nevertheless believes that the enlargement may be due to fatty deposit in the liver of persons who are perfectly healthy, and goes on to say that in such cases our efforts of treatment must be guided by our knowledge of the habits and tendencies of the individual. If the treatment is to be successful, a regular and rigid dietetic régime must be outlined.

DIET IN FATTY LIVER.—The dietary should be cut down to 1,800 or 2,000 calories, but there is no need to prohibit the use of fats so long as there is no jaundice; fats should be reduced to 30 or 40 grams a day at the most, and this can be done by forbidding fatty substances, fat meat and articles cooked in fat, and very much butter. It has been suggested by Fitz that a fatty diet—for instance, the diet often recommended for pulmonary tuberculosis, consisting of cod-liver oil, rich milk, butter, cream, etc., is productive of fatty disease of the liver. Gilman Thompson, in the dietetic treatment of fatty liver, advocates the use of foods that do not contain fat. Although, perhaps, carbohydrates should not be altogether forbidden, they should be taken in very considerably reduced amounts; potatoes, sugar, cakes, jam, marmalade, milk puddings should be forbidden and bread reduced to three or four ounces daily.

The patient may have an abundance of fresh vegetables and fruits, which may be chosen from the following list: cabbage, Brussels sprouts, kale, cauliflower, turnips, artichokes, lettuce, watercress, endive, chicory, dandelion, sorrel; apples, pears, oranges, grapes, tomatoes and bananas. Rich, fatty soups should not be taken, nor those thickened with flour, pea flour, lentils or beans. Meat or fowl are better boiled than prepared in any other way, because boiling extracts a portion of the meat bases and purins. Tea and coffee should only be taken in moderation.

The dietary on opposite page is recommended:

Tropical Hepatitis.—Tropical hepatitis, more commonly known as *tropical liver*, according to G. C. Lowe(5) may be due to several causes. The most frequent causes of this condition are: (a) dysentery (amebic); (b) malaria; (c) hot climate; (d) overeating and drinking in the tropics.

DIETARY FOR FATTY LIVER

<i>Breakfast:</i>	Calories
Eggs, one or two; lean ham, 1½ to 2 oz.; stale bread without butter; watercress, lettuce, dandelion leaves, endive, or tomatoes.....	368
<i>Dinner:</i>	
Vegetable soup, made with milk; boiled meat, fish or fowl; cabbage, savory, cauliflower, etc.; 1 oz. of bread; 1 or 2 new potatoes; artichokes; a small piece of cheese; tomatoes and lettuce; raw fruit, cooked fruit, and custard or junket.....	544
<i>Tea:</i>	
A cupful of China tea; ½ oz. of bread and butter if desired; strawberries, raspberries, apple, pear, apricot.....	325
<i>Supper:</i>	
Half pint of milk; ½ oz. of oatmeal (rolled oats, Quaker oats, coarse oatmeal) made into gruel, or vegetable soup, ½ pint; 1 oz. bread and butter; fruit, raw or cooked.....	440
TOTAL CALORIES.....	1677

DIET IN TROPICAL HEPATITIS.—There are no definite symptoms due to this condition distinct from those referable to the original disease. Fat in excess is present in the liver in numerous conditions, among which are obesity and certain instances of cirrhosis; in addition, it occurs to some degree in arsenic phosphorus and iodoform poisoning, in alcoholism, and in infective conditions, as tuberculosis of the lungs and gastroenteritis.

Diet forms an important part of the treatment of tropical hepatitis due to the ingestion of large quantities of food and drink, or to excessive heat. As acute congestion is present, it must first be relieved. The generous use of Carlsbad salts is promptly effective in mild cases. The diet must be restricted and only a minimum amount of alcohol allowed.

In more advanced cases in which fever has developed with tenderness and pain over the liver, hot applications, such as poultices or turpentine stupes, should be made over the hepatic region while the patient is kept in bed. The quantity of food should be cut down to its narrowest limits, being restricted to milk or milk and water. In case the patient is unable to adapt himself to this diet, barley water and weak beef tea may be substituted. No alcohol should be allowed.

When the case has become chronic, Sir Patrick Manson(6) advises the following régime: On awaking in the morning, the patient should sip a tablespoonful or more of powdered Sprudel salts. This will require about fifteen or twenty minutes. During this period certain patients are

able to take gentle exercise, while others with a tendency to sickness are best kept quiet in bed. For from half an hour to an hour, after the salts are taken, all food should be prohibited; then a light breakfast may be allowed. The amount of salt necessary for thorough evacuation of the bowels varies with the patient, and he himself will soon be able to determine the effective dose. This course of treatment should be continued for several weeks, the diet meanwhile being very strict. A very little meat, and that only once a day, is permissible; no fat, butter, nuts, pastry, fruits, preserves, canned foods, salads, cheese, beer, wines or spirits are to be allowed. After the completion of the cure, life in the country with a temperate climate is advisable. Here, warmly clad, the patient may indulge in active pursuits, avoiding cold baths, alcohol and all excesses, but taking regularly once a week a saline purge.

Hepatic Abscess.—DIET IN HEPATIC ABSCESS.—In the treatment of hepatic abscess, a not infrequent occurrence in tropical countries and sometimes a sequence of tropical liver, the aim should be to avoid overtaxing the digestive organs at any time, and to give assimilable and predigested food in small quantities at frequent intervals, once in four hours at least. No solid food should be given, with the exception of a little white fish, as sole or haddock, sweetbread and milk toast. Meat broths and light vegetable purées, with milk and eggs cooked in various ways, must form the staple articles of diet. Fats are best omitted, and strong alcohol in any form is absolutely forbidden.

Jaundice.—Hale White(7), in summing up the effects upon the alimentary tract of the exclusion of bile from it, says that when the bile is prevented from reaching the intestines, the gastric juice is increased, and hyperacidity develops. Whether or not the pancreatic secretion or the succus entericus undergoes any change is not known. Although it has been a matter of common belief that jaundice induces constipation, careful clinical work has shown this view to be erroneous, and has demonstrated that the dejecta may be loose and bulky. This fact appears logical when one considers the presence of fat that is not absorbed on account of the absence of bile. F. Muller in his investigations, both clinical and along the line of animal experimentation, has been convinced that although the absorption of fat is markedly hindered by the lack of bile in the intestines, this condition does not prevent the assimilation of carbohydrate, protein or inorganic matter in three or four times the normal amount. The proportion of water remains unaltered. Other interesting data are the following: Due to the presence of free fatty acids, the reaction becomes strongly acid; the crystals, resembling needles in shape, are visible macro-

scopically and cause the scintillating appearance of the grayish white fatty fecal matter; the specific gravity drops below 1.000 and the fatty substance floats on the surface of the water. These crystals are comprised largely of the calcium salts of palmitic and stearic acids. The normal proportion of fatty acids or soaps to neutral fat, 3 to 1, remains unchanged. It will be seen, therefore, that one function of bile is to put fatty acids and soaps into condition for absorption; when this function is suspended these substances remain unabsorbed.

Bile of itself is not antiseptic. It has no influence in preventing the growth of micro-organisms, and not infrequently it becomes infected in the gall bladder. Fecal decomposition cannot be traced to the lack of bile in the feces. On the contrary, one investigator points to a marked decrease of bacteria in the feces. If abnormal decomposition of feces was due to a lack of bile, then logically enteritis would become a sequela of jaundice. This, however, is not true. The characteristic odor of feces containing no bile is believed to be due to the fatty acids. In patients with prolonged jaundice, the emaciation which is often marked, even when there is no trace of malignancy, is in large part attributable to the lack of fat absorption. Finally, some evidence has been produced to show that the protein decomposition in the organism is increased by the presence of bile in the circulating blood.

Diet in Jaundice.—It is well known to the physician that the jaundiced have a marked repugnance to fat. Consequently, whatever the etiology of jaundice, the patient should not take fat. Hale White reports the history of a patient with an intestinal fistula high up in the jejunum, so that a large part of the food ingested was not utilized; in addition, a kink was present, making impossible the injection of food into the lower part of the ileum. Sterilized olive oil to the amount of three drams was injected under the skin night and morning. The oil was entirely absorbed, and this, together with the nutriment administered by mouth and rectum, increased the strength of the patient to such an extent as to make possible the operation for restoration of the continuity of the gut. The result was an excellent recovery. White suggests the value of an attempt to determine if, in a case of prolonged jaundice, fat can be administered in this way.

In this connection, it must not be forgotten that 300 calories of food is the daily limit for administration in this manner. The emaciation in jaundice is frequently too extreme to be laid entirely to the lack of fat in the blood. Several reasons are offered. Bile in the blood tends to bring about dyspepsia; frequently the cause of the jaundice leads to

dyspepsia; and, finally, it may be that the bile in the blood ultimately causes an excessive decomposition of protein.

For all these reasons, the patient should take plenty of carbohydrates and proteins; his meals should be small and frequent, seeing that he suffers from an excessive secretion of gastric juice.

The dietary for *chronic catarrhal jaundice* should be similar to that advised for chronic gastritis or chronic intestinal catarrh, preceded by a milk diet for two or three days.

Of the vegetables, many are not easily digested, or their water content is so great that the nutritive value is small. White advocates the use of lentil flour which has 65 per cent of carbohydrate, 22 per cent of protein, but only 1.5 per cent of fat. Well-cooked potatoes are also useful for the jaundiced, as they have about 20 per cent of carbohydrate and slight fat content. The skins should be left on during the steaming or baking, in order to conserve their proteins and salts. Other suitable articles of diet are bread, toast and biscuits, particularly when eaten with jam or marmalade. Maltine, unless it causes indigestion, is valuable. Tibbles and others give a much wider range of vegetables than does Hale White, recommending all kinds which contain cellulose and tend to promote intestinal activity. However, when intestinal catarrh is marked, care must be taken not to eat such vegetables as are apt to aggravate this condition. Rice, tapioca, sago, arrowroot, grapes and bananas, may all be given, while amylaceous foods, consisting of white or brown bread, crackers and plain cakes, are all allowable. Infants' foods, as a rule, have very little fat and so are useful. Lean meat, white fish, poultry and game are allowed; meat is better eaten cold than hot. Whey and buttermilk, being milks from which the fat has been taken, are excellent beverages for this dietary.

As to beverages, these may consist of weak tea or coffee, with no cream and very little sugar, and aerated alkaline waters. The patient may also drink ordinary solutions of bicarbonate of soda, acetate of potash, or cream of tartar in lemon water. Rich foods, fat fish, hot meat, spices, sweets and alcohol, except in weak and restricted amounts, are to be avoided.

It is thought advisable to amplify the foregoing by outlining, in detail, examples of a dietary appropriate for simple catarrhal jaundice and jaundice due to inoperable malignant disease. In the first type of the disease an easily digested alimentation, largely protein in character and free from fats, is the one of choice. Its nutritive or energy value is small, but amply sufficient for the first two or three days of the illness, and it will promote a speedy return to a more liberal régime.

DIETARY IN JAUNDICE (Chalmers Watson)

	Calories
7 A.M.	
10 oz. mineral water	
<i>Breakfast</i> —8 A.M.	
10 oz. skimmed milk, thickened with white of egg or albumin water; 1 slice of toast without butter.	203
<i>Lunch</i> —10 A.M.	
10 oz. buttermilk.	116
<i>Dinner</i> —1 P.M.	
10 oz. clear soup thickened with Plasmon; or 10 oz. beef-tea thickened with meat juice; or 10 oz. beef-tea thickened with scraped raw beef; slice of toast or roll; pudding (not made with egg) stewed fruit without cream; a little milk.	285
<i>Tea</i> —4 P.M.	
Cup of tea with little sugar; half slice of toast.	160
<i>Supper</i> —6 P.M.	
10 oz. skimmed milk; a little sherry may be added if desired, as a flavoring agent; an invalid food.	280
10 P.M.	
10 oz. mineral water.	280
TOTAL CALORIES.	1,044

Later on, as the appetite returns and the stomach is more tolerant of foods, the diet can be gradually increased. The following, in the author's experience, has given satisfactory results:

DIETARY IN JAUNDICE

	Calories
7 A.M.	
10 oz. mineral water.	
<i>Breakfast</i> —8.30 A.M.	
A cup of freshly made tea with a little milk; crisp made toast without butter; piece of steamed fish or slice of ham, tongue or chicken.	362
<i>Lunch</i> —10 A.M.	
10 oz. fresh buttermilk; 1 sweet biscuit.	196
<i>Dinner</i> —1 P.M.	
A cup of barley or sago soup; a piece of white, steamed or boiled fish, or a piece of chicken or pheasant broiled, or a tender eye of mutton chop, or a piece of roast beef; spinach or cauliflower or stewed celery; stewed fruit served with milk and a dry biscuit; 8 ounces fresh apple cider.	385
<i>Tea</i> —4 P.M.	
1 cup of tea and 1 dry rusk with butter.	217
<i>Supper</i> —7 P.M.	
A cup of sago soup; a small serving of white fish, or a piece of breast of chicken or pheasant, or eye of a mutton chop; piece of dry toast with gravy; 8 oz. fresh apple cider.	267
9 P.M.	
1 glass malt extract.	150
TOTAL CALORIES.	1,577

In the *dietetic treatment of jaundice due to inoperable malignant disease*, Watson recommends the following diet¹:

7 A.M.

Calories

10 oz. plain water or mineral water.

Breakfast—8 A.M.

Cup of weak tea, with little sugar; slice of toast or roll, with a little jam or marmalade; no butter; fish, ham, or cold tongue..... 205

Lunch—11 A.M.

10 oz. mineral water, or an equal amount of buttermilk..... 116

Dinner—1 P.M.

Bowl of clear soup; oysters, fish, chicken, or sweetbread, with small amount of mashed potato, and spinach, cauliflower, or asparagus; stewed fruit, with very little milk; no cream..... 251

Tea—4 P.M.

Cup of weak tea, with little sugar; half-slice of toast..... 105

Supper—7 P.M.

(Two courses.) Much the same as dinner.

Steamed fish, or light entree; custard, or curds, or stewed fruit; a little alcohol, in the form of whisky or brandy..... 350

TOTAL CALORIES PER DAY..... 1,027

Torpor of Liver.—Torpor of the liver, *hepatic torpor*, *hepatic inadequacy*, is the most common form of liver complaint; it often leads to irregular gout and is due to defective liver metabolism. As the name denotes, the organ is tardy in performing its normal functions and has a tendency to become choked with bile, glycogen and urea. Torpidity frequently is the forerunner of chronic congestion of the liver. There is a normal physiological increase in the amount of blood in the liver after each meal; eating and drinking to excess greatly increases this physiological fluxion; it is continued for a longer period, and being frequently repeated, brings about in time a permanent dilatation of the blood vessels. Strongly spiced foods and alcohol tend to keep up the irritation and inflammation of the organ, and fibrous tissue is greatly increased. This condition is, as a rule, the beginning of cirrhosis. Although alcohol has been held chiefly responsible for "gin drinker's liver," or "hob-nailed liver," views with regard to the part played by spirituous liquors in producing this condition have been considerably modified in recent years. It is doubtful if fibrosis culminating in "hob-

¹ For additional dietary, see Volume III, Chapter XXVIII.

nailed liver" is so characteristically associated with inebriety as was formerly believed. Not only is its occurrence among hard drinkers comparatively infrequent, but it is met with in those who have led perfectly abstemious lives. Alcohol in the form of spirits may be the most common cause (wine and beer do not cause it, at any rate, to the same extent), but the importance of other causative factors is shown by the occurrence of the disease in animals and children who have never tasted alcohol. According to Tibbles, a case of typical cirrhosis was observed in a butcher's cat, which suggests that the disease in this instance was due to excessive meat eating.

DIET IN TORPID LIVER.—The treatment of torpid liver is by means of medicinal, hygienic and dietetic measures. There are many ways of influencing the liver; sometimes temporary starvation is effective in relieving the torpidity, because lack of food compels the liver to supply the organism with glycogen. Increase in the accumulation of nitrogenous waste products can be prevented by withholding protein foods. By clearing the intestinal canal of its entire contents, by means of lavage or strong purgatives, the liver can be incited to supply glycogen for the tissues and bile for the digestion. Various drugs stimulate the liver cells to biliary activity, and by these means hepatic ducts and bile channels can be cleansed of the materials accumulated during the period of torpidity. Free purgation will relieve the pressure in the portal veins, increase the diuresis and excretion of urea and other products of protein metabolism, and generally relieve the system. Nevertheless, the continued use of strong purgatives is to be deprecated. Their use becomes a habit, stronger and stronger doses are required, and the organs concerned with the digestive process become enfeebled. The administration of purgatives should be restricted as much as possible. Torpid liver can be prevented, or relieved and cured, unless the condition has been too long neglected, by judicious dieting, exercise in the open air, and by a sane and rational mode of living generally. Plenty of water should be drunk.

The dietary for a torpid liver greatly resembles that for indigestion. When there is deficiency in the secretion of bile, it is best to avoid fatty foods, especially foods cooked in fat, and indeed all articles of food which contain much fat. Spices and condiments should be omitted on account of their effect on the portal circulation. Alcohol, strong coffee and strong tea are undesirable as directly irritating to the hepatic structures, especially alcohol. It is wise to reduce the total dietary temporarily to about 1,800 or 2,000 calories, including at most 80 grams of protein, 40 grams

of fat, and 280 to 300 grams of carbohydrates. Tibbles advises that it should be selected from the following articles:

DIETARY FOR TORPID LIVER

- Soups:* Vegetable soup or light clear broth, containing little extractive matter, and made chiefly of leeks, onions, celery, turnips, carrots, mint or thyme and bones.
- Fish:* Sole, plaice, whiting or haddock; boiled cod, bass, perch, pike, brill, skate or flounder; raw oysters.
- Meat:* Tender mutton, lamb, chicken, pheasant or rabbit. These foods should be boiled, as that method of cooking removes a considerable proportion of the extractives.
- Carbohydrates:* White or brown bread, dry toast, rusks or rolls; plain milk puddings, custard, blancmange; potatoes, cabbage, cauliflower, spinach—Brussel sprouts; endive, lettuce, tomatoes; and fruit may form a part of the dietary.

Visceroptosis.—DIET IN VISCEROPTOSIS.—A wandering liver is nearly always a manifestation of general visceroptosis, and the treatment is mainly on the same lines as in that disease. The patients often require "feeding up," but care must be taken to avoid flatulence. Women with visceroptosis invariably suffer from intestinal stasis, and the dietetic treatment of intestinal stasis is, as a rule, suitable in such cases.

REFERENCES

1. ROLLESTON, H. D. Latham and English's System of Treatment.
2. YEO, BURNEY. Textbook Physiology.
3. BINET. Tribune méd., 1910.
4. TORBETT, JOHN W. The Etiologic and Therapeutic Value of Foods in Chronic Diseases, Texas State Med. Assn., May, 1911.
5. LOW, G. C. Latham and English's System of Treatment.
6. MANSON, SIR PATRICK. In his work on Tropical Diseases.
7. WHITE, HALE. Sutherland's System of Diet and Dietetics.

CHAPTER V

DIET IN DISEASES OF THE RESPIRATORY SYSTEM

KARL VON RUCK, B.S., M.D.

General Considerations.

Asthma: Primary and Bronchial Asthma.

Pneumonia: Bronchopneumonia.

Bronchitis: Acute Bronchitis; Chronic Bronchitis.

Diseases of the Lungs: Congestion of the Lungs; Edema of the Lungs;

Emphysema; Empyema; Hay Fever; Pleurisy.

Tuberculosis: Symptoms of Tuberculosis; Pulmonary Tuberculosis; Modern Methods of Treatment; Principles of Diet; Sanatoria and Home Treatment of Tuberculosis.

Tuberculosis of Various Organs: Laryngeal Tuberculosis with Dysphagia;

Hemoptysis: Tuberculosis of the Intestines, Kidneys and Bladder.

GENERAL CONSIDERATIONS

A perfect respiratory apparatus is essential to the complete well-being of the organism, and when respiratory complaints exist, care must be taken that diet does not have a bad influence upon the respiratory movements or upon the circulation. The regulation of feeding then is a matter of the first moment in the treatment of diseases and affections of the air passages. The amount of food, the kind of food and regularity of meals count for much in the successful treatment of all acute pulmonary affections.

In diseases of the respiratory system, diet is a factor of great importance, not only from the curative standpoint, but from the viewpoint of alleviating symptoms and relieving the discomfort of the patient. It must be remembered, too, that whatever interferes with respiratory activity has a correspondingly injurious effect upon metabolism. Therefore, it is obvious that much harm may be done by an injudicious or excessive diet. The main object then in the dietetic treatment of respiratory affections is, so to regulate the quality and quantity of the food that an increased amount

of work will not be thrown on the already overtaxed lungs. For example, if, through unsuitable feeding, the intra-abdominal pressure is raised by flatulent distension, the free action of the lungs will be impeded. Diseases of the lungs diminish their capacity for respiratory purposes, and cause a diminuation of the gaseous exchange. The respiratory function of the lungs is impaired in most pulmonary diseases; and an improper dietary may contribute to the retention of carbon dioxid in the blood and tissues, and interfere otherwise with proper oxygenation.

Also the circulation of the blood through the lungs must be taken into consideration. When pulmonary disease is present, circulation is always impeded to a greater or less extent, on account of the obstruction which is always a feature of the disease. It is obvious that healthy blood flows with greater freedom than unhealthy, and this being so, if the blood is loaded with a superabundant amount of food products, the circulation through the lungs will be rendered still more difficult. Such conditions of the blood must be avoided, as far as possible, as they tend to bring about cardiac debility and exhaustion, the gravest dangers in all pulmonary diseases.

In chronic affections the question of diet is not so important from the standpoint of being a disturbing factor, because to a large extent a state of equilibrium has been established between the lungs and the other organs. In many chronic affections more direct benefit can be produced by the diet than in the acute diseases. But stress should be laid on the point that in all diseases and affections of the respiratory system, diet plays a rôle of almost inestimable importance.

ASTHMA

Primary and Bronchial Asthma.—Cases of asthma may be divided into two groups: (*a*) Primary, idiopathic, or spasmodic asthma; and (*b*) bronchial asthma, where the asthma is associated with a bronchial catarrh. However, this is entirely an arbitrary division, as there is no hard and fast dividing line between the two types of cases. One may merge into the other, and in both the same etiological features have to be considered.

Asthma is a paroxysmal neurosis, a chronic disease distinguished by acute exacerbations recurring at more or less frequent intervals. An attack can generally be traced to some reflex peripheral or central irritation. Owing to the nervous idiosyncrasy peculiar to asthmatic subjects, there are also coincident idiosyncrasies with regard to the diet. Some articles of food, not necessarily indigestible, may precipitate an attack, or

foods of an indigestible nature may cause gastric disturbance and be the starting point of a paroxysm.

Generally in these idiosyncrasies of asthmatic patients the special idiosyncrasy varies with the individual. The disease is often associated with toxic causes, alimentary toxemia, Bright's disease, etc. Some foods may really act as poisons and their toxic effects are manifested after absorption into the system. Experience appears to teach that some stomach reflex is set up by certain kinds of food which promptly bring on an attack. The sufferer himself will discover and avoid foods having this influence.

A careful examination should be made of the stomach and alimentary tract for the presence of symptoms of dyspepsia, and, if possible, a relationship between the attacks and particular articles of diet, or the ingestion of hearty meals at night, should be established.

DIET IN ASTHMA.—This disease can to some extent be prevented and greatly bettered by diet, but it cannot be thus cured. During an acute attack, the diet must be very rigidly restricted and as easily digestible as possible. Tibbles in some cases recommends strong coffee, which should be made from Mocha berries in the proportion of two ounces to one-fourth pint of boiling water. Romberg found sucking small pieces of ice helpful, and the application of ice in a towel along the course of the pneumogastric nerve in the neck gave relief in five minutes. At this stage, the employment of fluids is preferable in the form of plain meat soups or bread and milk.

Alcohol in the form of spirits gives relief in many cases and there is little doubt that alcoholic drinks do relieve an asthmatic attack, but this fact only makes this indication more dangerous. Should the physician prescribe alcohol, the patient is apt to resort to this means of relief whenever his breathing becomes troublesome. Large amounts of alcohol are often consumed by the sufferer from asthma on the plausible plea that he has been ordered to take it, and in time he may become a confirmed tippler. For the sake of patient as well as physician, it is best not to prescribe alcohol in any form for the relief of asthma.

With regard to diet between the attacks, the asthmatic should be taught to regard his digestion and the selection of his food as of the utmost importance. The dietetic treatment should consist in recommending a simple, wholesome and well-cooked variety of foods. Sutherland thinks that it is better to state what should not be taken rather than what is allowed. In the forbidden list will be placed rich sauces, pastry, sweetened puddings, cooked butter, cheese, nuts, dried fruits, pickles, salmon, pork sausages, and all re-cooked meats and made-up dishes, because of their lia-

bility to cause digestive disturbance. To this list will be added the stronger wines, such as port, sherry and Burgundy, except in strictly limited amounts.

The sufferer himself will not be long in finding out what articles of diet tend to provoke an attack, and indeed he must be the best judge as to what suits and what does not suit him. It is only by close observation that conclusions can be drawn and a dietetic régime compiled. In one case it may be found that an attack is brought on by an excess of carbohydrates. There may be difficulty in digesting carbohydrates, especially those of the sweet variety, which cause flatulence, distention of the stomach, interfering with respiration and reflexly producing dyspnea. In another case, trouble in digesting proteins may be experienced, and in yet another case fats may prove hard to digest. Therefore, we must not jump at the conclusion that because one asthmatic patient thrives on a vegetarian diet, such is the diet for asthmatics in general. A lacto-vegetarian diet may be prescribed with complete success, or a sour milk, or a purin free diet, or an ordinary light nourishing diet for the debilitated, or meat and hot water diet for the gouty. By judicious dieting, alimentary toxemia can be warded off, reflex nervous asthma prevented, and strength regained by debilitated patients. Gout is the underlying cause in many cases of asthma, and for these a special regimen may be required which will be considered under the head of gout.

In considering the quality and suitability of the food, the fact must not be lost sight of that the quantity is of much importance, as is also the time of the daily meals. A heavy meal often brings on an attack, or at least the breathing is unfavorably affected. These patients must guard against a tendency to overeat. On the other hand, it is not wise to allow the intake of food to be too low. Some patients afraid of inducing an attack are prone to go to extreme lengths of self-denial in food and thus do not consume sufficient aliment to maintain their general health. The happy medium should be the motto for patients addicted to asthma. The chief meals should be taken early in the day, and late dinners or suppers should be avoided. Three moderate meals a day can be taken, as a rule, without disturbance, but in some cases the better plan is to have four light meals a day so as not to run the risk of overloading the stomach. A heavy meal in the evening is calculated to bring on an asthmatic attack during the night; consequently, the evening meal should be light and eaten no later than three hours before going to bed. Eating between meals is an unwise indulgence for the asthmatic. If the above suggestions be followed, the stomach will not be overloaded, nor the digestive organs

taxed by unsuitable foods taken in too generous amounts, or irritated by condiments, spices and alcohol. Animal food may be taken in the form of tender lean beef or mutton, chicken, guinea fowl, rabbit and white fish. Milk sauce, onion sauce, apple sauce, or jelly may be added. Potatoes may be eaten in moderation, baked potatoes being best. Cauliflower, spinach, spring cabbage, boiled lettuce, seakale and tomatoes may be allowed. Milk puddings, custard, junket and cooked fruits may be eaten somewhat sparingly.

Gilman Thompson suggests the following diet as giving a general idea of the regimen for fairly advanced cases:

DIETARY FOR ASTHMA (Thompson)

Breakfast:

Bread and milk or well-cooked oatmeal porridge or wheaten grits without sugar; lemon juice may be added instead. A chop or a little broiled fresh white fish, coffee without sugar.

Dinner, not later than 2 P.M.

Beef or mutton, bread, one or two green succulent vegetables, such as spinach, stewed celery, stewed or raw tomatoes. Blancmange or unsweetened custard or a little rice pudding. Fresh fruit in season, as a peach or baked apple.

Supper—6 P.M.

A soft cooked egg or a little cold fowl or game, stale bread, toast or zwieback, milk, stewed fruit without sugar. Tea, coffee and cocoa may be allowed to form part of the dietary, provided that they are not found to increase the difficulty of breathing.

PNEUMONIA

Bronchopneumonia—DIET IN BRONCHOPNEUMONIA.—It is now generally recognized that bronchopneumonia is an infection usually due to the pneumococcus, streptococcus, staphylococcus, Friedländer's bacillus or *B. coli*, singly or in combination, more rarely some other organism, such as the *B. typhosus*. Diet in the treatment of this disease is of paramount importance, for distention of the stomach tends to produce embarrassment of respiration. It would be impossible to lay down strict rules for the diet of patients of all ages. The diet should be one easy of digestion and not apt to give rise to flatulence. The food materials to be employed are milk, or according to Sutherland, whey, beef, mutton or chicken soup and coffee or tea with an egg in it. In a general way, thirst is a marked feature, appetite is lost, and digestion is greatly impaired owing to the high temperature and the toxemia present. One and a half pints of whey or milk, one pint of soup and one egg daily represent a sufficiently full dietary. The milk may be rendered more palatable and digestible by the

addition of lime water, barley water or Apollinaris water. Briscoe(1) says that it is a good rule to order a liquid diet consisting of milk freely diluted with water, or water to which sodium citrate, in the proportion of one and one-half grains to one ounce of milk, has been added. Care must be taken in giving farinaceous preparations—that is, they must be given in limited amounts owing to their tendency to induce indigestion and flatulence. Sugar of milk is suitable from one-half to one ounce daily. Soups should be prepared from fresh meat or fowl.

The quantity allowed at each meal should be considerably reduced as compared with that taken by persons in health. Meals should be given every two or three hours during the day and every four hours during the night. Overfeeding in pneumonia is a mistake; the object should be rather not to give more food than just sufficient to maintain the patient's vital powers. The fever is a short one, and his vitality is lowered by introducing more food than he can assimilate. The comparative starvation principle is especially adapted for the treatment of the full-blooded pneumonic patient. In debilitated and elderly subjects, on the contrary, it is essential to keep the powers of resistance at their highest point, and therefore in the treatment of these cases as much nourishing food must be given as the patient can take, avoiding large amounts of carbohydrates. Eggs, meat juice, beef tea, jelly and even cream may be given, but extreme care must be exercised in order not to overtax digestion. Flatulent distention of the stomach and bowels must be avoided with special care, as the effect on the heart and lungs from upward pressure may jeopardize the patient's chances of recovery. When gastric disturbances are present, Sutherland advises that the food should be peptonized and given in small amounts, two-thirds ounce every hour during the day.

Neutral lemonade, sweetened or not, is valuable to relieve thirst and may be given freely at all ages. It replaces the fluid lost by sweating and exerts also a useful expectorant action. These drinks may be given cold, but not iced unless sipped slowly, to avoid chilling the stomach. The first fluid taken in the morning should contain an alkali, such as soda bicarbonate, in the strength of twenty grains to ten ounces of liquid. If fluid is not taken freely by the mouth, and if the secretions are scanty, hot saline injections by the rectum or subcutaneously should be employed. As stands to reason, elimination of the poison is most desirable, and this object is best achieved by a plentiful supply of the system with fluid.

Sutherland lays emphasis on the point that a careful distinction should be made between the fluids which are given as foods and those which are given as drinks. The times of feeding are to be rigidly adhered

to, and the drinks given between meals should not contain any milk, soup, or anything which will arouse the digestive functions. Tibbles criticizes the contention that a low diet is indicated in the treatment of pneumonia and quotes some observations of Ewald showing that instead of diminishing the amount of nutriment, we ought to meet the increased demands by giving such foods as the body can digest and assimilate. Tibbles further adds that it has been shown that proteins and carbohydrates are almost as well digested in fever as in health, whereas fat is not quite so well absorbed. It is true that the old adage of "starve a fever" has not been found to be in accordance with strict common sense, and that the diet in fevers should be considerably more generous than was formerly believed.

In treating pneumonia from the dietetic standpoint, we are to some extent on the horns of a dilemma. Appetite is lost, and probably this is nature's way of showing that the digestive powers are weakened. Per contra, fever weakens the system and nourishment is needed to maintain the body's powers of resistance. In the case of full-blooded pneumonia patients, the diet may be reduced to such a degree as is consistent with the maintenance of the vital powers, while in the elderly and debilitated as much suitable nourishing food may be given as the patient is able to assimilate, with this proviso that this food does not create gastric disturbance, notably flatulence. It simply means this, that physicians and nurses must closely watch their pneumonia patients and if the food given causes flatulent indigestion, it must be reduced in quantity. All this *merely* goes to show that the physician is more concerned in the dietetic than in the medicinal treatment of his pneumonia patients. A somewhat spare diet then for the full-blooded subjects and a fairly full diet for the debilitated and aged; always watching for gastric symptoms.

ALCOHOL IN PNEUMONIA.—The question of alcohol in the treatment of pneumonia is a vexed problem, as is the value of alcohol in the treatment of any disease. A great many authorities dogmatically state that alcohol is a negligible quantity in the treatment of pneumonia, claiming that it possibly does more harm than good. Others equally competent say that alcohol is a valuable stimulant in pneumonia and should be prescribed at regular intervals. The late Andrew H. Smith, M.D., of New York(2) favored the use of alcohol in pneumonia and offered an explanation why excessive amounts could be given without producing toxic effects. Of course, the object in giving alcohol is to avoid the risk of death from cardiac failure—the usual cause of mortality from pneumonia. Sutherland in reviewing the case for and against the use of alcohol in pneumonia arrives at the conclusion that no rules can be laid down which will apply

to all cases. The nature of cardiac failure must be understood if treatment is to be anything but empirical. Two assumptions on this phase of the question may be made, first, that the commonest cause of cardiac failure in pneumonia is poisoning and paralysis of the medullary center, and secondly, that alcohol is, in the majority of cases, a stimulant of that center. To explain in detail all the reasons for adopting these assumptions would take too much space. The following points, however, may be referred to briefly. Pneumonia differs from most of the other acute fevers in that there is a tendency to cardiac failure within a brief period. Moreover, in the majority of instances, no post-mortem changes are found in the heart in pneumonia other than those common to pyrexial and toxic conditions. The pyrexia is not in itself a sufficient cause, for in other affections pyrexia of equal degree does not rapidly induce fatal cardiac failure. Neither is the embarrassment of the pulmonary circulation sufficient to bring about the conditions witnessed in pneumonia. Therefore both from the clinical and post-mortem evidence we are unable to trace the fatal result to the heart or to the circulation.

In the nervous system evidence is found early in the disease that the medullary centers are affected. All signs such as rapid breathing, so distinctive of pneumonia, and the cardiac action point to stimulation of the respiratory center and not to pulmonary embarrassment. In short, both in the early and later stages of the disease all signs go to show that it is the medullary centers which are mainly affected by the poisoning. Why the cardiac failure should precede respiratory failure appears to be due to the fact that a patient possesses accessory muscles and methods of respiration, while he has no means of aiding the circulation.

The second assumption, that alcohol is in the majority of cases a stimulant to the medullary centers, is based on the clinical experience of many observers.

Sutherland lays down the following postulates which must be taken into consideration: 1. The proper time for giving alcohol. 2. The indications for its use. 3. The contra-indications. 4. The form and dosage, and 5. The condition of the patient, apart from pneumonia, which may affect the treatment.

But before entering into this consideration, it may not be out of place to set down the opinions of several British medical authorities on alcohol as a drug, published in the London *Lancet* a few years ago:

In view of the statements frequently made as to the present medical opinion regarding alcoholic beverages, we, the undersigned, think it desirable to issue

the following short statement which we believe represents the opinions of the leading clinical teachers as well as the majority of medical practitioners. Recognizing that, in prescribing alcohol, the requirements of the individual must be the governing rule, we are convinced of the correctness of the opinion so long and generally held, (a) that in disease alcohol is a rapid and trustworthy restorative; (b) in many cases it may be regarded as a life preserver, owing to its power to sustain cardiac and nervous energy, while protecting the wasting nitrogenous tissues.

As to the proper time for giving alcohol in pneumonia, there is no need for it at the beginning of an ordinary attack of the disease in a previously healthy or fairly healthy subject, whose strength should be sustained by suitable food. After the fourth day, or when the signs of the precritical stage present themselves, alcohol may be advantageously given and continued through the exhausting period of the crisis, until recuperation has set in. After the crisis has passed, the amount of alcohol may generally be rapidly diminished. With regard to the indications for the use of alcohol, the pulse may be taken as the first criterion. When the pulse becomes small or irregular or compressible, and runs up to 110 or more per minute, alcohol is called for. The more suddenly this change takes place, the more urgent is the need for alcohol. Unless some evidence of cardiac weakness is recognized, it is not advisable to give alcohol. Sleeplessness, dry mouth and tongue induced by the effect of cardiac weakness on the secretions, delirium of a low muttering type due to weakened circulation through the brain, are other indications for the use of alcohol.

All cases in which alcohol is given must be closely watched in order to decide whether the stimulant is acting in a beneficial manner. If it be found that no improvement follows its administration, it should be discontinued. It must not be forgotten that many cases of pneumonia can be successfully treated without alcohol, and that the indications for its use should be perfectly obvious as in the case of any other powerful drug.

Contra-indications.—When the pulse is full and bounding, never give alcohol, even though there be restlessness, sleeplessness, delirium or loss of appetite. In acute inflammation of the heart, Sutherland thinks that the less alcohol given the better. If there is much pulmonary edema or bronchial catarrh, the free use of alcohol will rather tend to aggravate the condition unless it is traceable to weak action of the left ventricle, as the chief use of alcohol is to strengthen the action of the left ventricle after the state of the pulmonary circulation has been relieved. In patients prostrated by profound anemia, alcohol is of little avail. In short, it is not

the collapse caused by general toxic infection that alcohol benefits, but the collapse brought about by failure of the cardiac center.

The *form* in which alcohol is given is important. Sutherland recommends the use of a sound brandy or whiskey because it allows of exact alcoholic dosage and supplies the stimulant in a form best suited to most stomachs. On the grounds of palatability and quickness of effect, champagne has distinct merits, and in disturbed states of the stomach, may on occasions act better than brandy. When the stage of convalescence has been reached, port or sherry or Burgundy may be employed in place of the spirit.

The question of *dosage* must be to a very large extent determined by the requirements of the case. Speaking generally, it may be said that a mild amount of stimulation can be secured by three ounces of brandy or whiskey in the day, a moderate amount by six ounces and a full amount by nine ounces. A person suffering from pneumonia can take such quantities of alcohol which in a state of health would produce the usual symptoms of inebriety. The object of the stimulation is to raise the force of the circulation as nearly as possible to the standard of health, and the dosage must be regulated in conformity with that principle. As to the injurious effects of alcohol on the tissues, such an effect depends upon the length of time during which the absorption of alcohol is continued. The advisability of using alcohol in pneumonia is a different matter from that of using it in other diseases, for the reason that pneumonia is a self-limited disease, and the period in which stimulation is needed in pneumonia may be set down as from three to six days. It is merely a question of using heroic remedies to tide over a critical period.

It is advisable to give the brandy or whiskey in doses of from two to four drams, at regular intervals, and diluted with at least twice the amount of water. The aim is to produce a steady and continuous stimulative effect. Larger doses tend to upset the digestion and to produce a temporary overstimulation followed by a reaction. Sometimes, however, a condition such as sleeplessness or delirium is best treated by one full dose of from one to two ounces. Age must be taken into consideration with regard to the employment of alcohol in pneumonia. Its use is seldom called for in the lobar pneumonia of infancy and childhood. In elderly people, however, the poison of the disease tends to impair the cardiac action at an early stage, and in consequence the early use of alcohol is indicated. While alcohol is called for early in the attack, it is rarely necessary to employ such full doses as in middle life.

Some twenty years ago the author attended a case of acute lobar pneu-

monia in a healthy young adult in which the free administration of apple brandy gave the most satisfactory results. The patient was a robust male, good family history, aged twenty-two years, with a pneumonia involving the entire right lung. The pulse, temperature and respiration were greatly accelerated. The cardiac action was weakened from the overwhelming influence of the toxemia. The body surface, mouth and tongue were dry and a low muttering delirium present. Apple brandy was ordered, two ounces every hour; this was continued thirty hours, during which time half a gallon was consumed without any symptoms of alcoholism being manifested, but on the other hand, with a satisfactory amelioration of all the toxic pneumonic symptoms, the pneumonitis terminating in resolution and recovery. Personally, we do not believe that any other stimulant than the one administered would have overcome the toxemia and sustained the heart during the crisis. (W. E. F.)

The chronic alcoholic patient is, as is well known, always a bad subject for pneumonia, but he must be treated with alcohol freely. He cannot be fed up as the ordinarily healthy individual suffering from pneumonia, and if his accustomed stimulation is neglected, a fatal termination will probably be precipitated. Also he must be given stimulants in large amounts—in fact, somewhat in proportion to the quantity he is in the habit of taking.

The above views perhaps express the opinions of a large proportion of members of the medical profession in all parts of the world with regard to the value of alcohol in the treatment of pneumonia. It is frequently not called for at all, but clinical experience seems to have shown that in threatened cardiac failure, in a good many cases, its administration is indicated. The old saying that “so long as alcohol reduces the pulse rate, steadies the heart, and increases its tone, it is doing good,” is a good maxim for physicians who are treating cases of pneumonia. It should not be prescribed in the early stages of any acute disease, lest reaction to its use comes on before the crisis. Alcohol is not necessary, possibly in the majority of cases of pneumonia, but clinical observation appears to have proved in a sufficiently conclusive manner that there are cases of pneumonia when alcohol used at the proper time and in proper doses is a drug of very considerable value.

BRONCHITIS

Acute Bronchitis—DIET IN ACUTE BRONCHITIS.—Bronchitis of the acute type should be treated in the same way as other febrile diseases. The diet should at first consist of warm fluids only; two pints of milk and

one of broth daily in five-ounce feedings every two hours. In gouty subjects, the milk may be replaced by peptonized farinaceous foods made with water. Whey is a form of milk especially indicated if there is a tendency to flatulency. Milk foods should be taken slowly with a spoon. Soups should be weak, for if concentrated they are apt to cause indigestion and overloading of the blood. Regular hours of feeding should be adhered to. As the case progresses, oysters, farinaceous foods and fish may be added to the diet.

In the dry stage of pulmonary catarrh, when coughing is persistent and expectoration difficult and the expectorated matter thick and scanty, a good deal of relief is afforded by drinking hot fluids, as lemonade, linseed tea, weak tea or barley water, freely, outside of meal times. When expectoration is easy, the intake of fluid should be limited, as care must be taken to avoid flatulence because this condition interferes with the movements of the diaphragm, further embarrassing the respiration. Stimulants should not be given unless there is some special indication. If there are signs of exhaustion, or of heart failure, or if the patient has difficulty in obtaining an adequate amount of sleep, carefully regulated doses of stimulants should be given. For this purpose brandy in water is best.

Chronic Bronchitis.—Chronic bronchitis is due frequently in the first instance to cardiac or renal disease or gout, and the diet must be adapted to the treatment of the primary cause.

A type of chronic bronchitis commonly met with is that brought on and maintained by the excessive consumption of spirituous liquors. Those who are not necessarily drunkards but who are habitual drinkers are prone to what may be termed alcoholic bronchitis. The excretion of alcohol by way of the lungs leads to pulmonary catarrh, bronchial secretion and coughing. Therefore in cases of chronic bronchitis it is well to inquire how much alcohol the patient is accustomed to take, and if the amount is beyond the physiological allowance, it must be reduced. In another type of chronic bronchitis, there is a close association with obesity. Sutherland points out that, after the age of forty, some persons show a progressive tendency to put on flesh. A direct relation exists between the increase of the fatty tissue and the bronchitis, and in fact, the increase of fat is to a very large extent responsible for the bronchitis on account of the venous stasis associated with it. As a result, the oxidation of the tissues remains incomplete, the blood contains an excess of carbonic acid, and extra work is thrown upon the lungs.

DIET IN CHRONIC BRONCHITIS.—The dietetic treatment of the obese type of chronic bronchitis is much the same as the treatment for obesity, which will be discussed later. With the decrease of weight the condition of the bronchial tubes will be greatly improved. In the chronic bronchitis of elderly people, which is mainly due to cardiac weakness and difficulty in respiration, a more stimulating form of treatment is called for. Small meals of a nourishing nature should be taken at frequent intervals. The bronchitis of infancy will be dealt with in the section on children's diseases.

DISEASES OF THE LUNGS

Congestion of the Lungs.—Congestion and edema of the lungs are, in the majority of cases, secondary to disease elsewhere; consequently, in their treatment, the cause must be sought for, diagnosed and treated. Congestion of the lungs may be clinically classified as follows: 1. acute congestion; 2. chronic congestion; 3. hypostatic congestion; 4. edema. Dietetic treatment does not enter to any extent into the question of acute congestion.

DIET IN CHRONIC CONGESTION.—Chronic congestion, or brown induration of the lungs, is almost invariably a secondary result of cardiac failure. In its dietetic treatment, alcohol may be given to the patients sparingly and as a temporary expedient. Good brandy, whiskey or champagne are the best forms in which it can be administered. With regard to food, this should be chiefly liquid and soft, and should be given in small amounts at one time so as to avoid overdistention of the stomach and increase of the cardiac embarrassment. In cases secondary to cardiac disease, French writers insist on the importance of a régime lactée or rigid milk diet.

DIET IN HYPOSTATIC CONGESTION.—This form of passive congestion occurs in the most dependent parts of the lung, due partly to enfeebled circulation and partly to the action of gravity, both factors leading to engorgement of the blood vessels. It is very frequently seen in the aged or enfeebled, especially when bed-ridden. Good, nourishing food should be given at frequent intervals, with brandy if the pulse shows signs of failing.

Edema.—Edema of the lungs to a certain extent is probably an invariable accompaniment of all forms of congestion. In mild cases the dietetic treatment is practically that of the congestion to which it is due.

In cases due to renal disease a strict milk diet or even a salt free diet is recommended by French physicians.

Emphysema.—Emphysema may be defined as a dilatation of the alveoli of the lungs with atrophy of their walls. Hypertrophic emphysema is the most serious form of this disease, and if the consequent atrophy could be guarded against, a valuable prophylactic measure would be established. In a considerable proportion of cases, as Wethered points out(3), the atrophy is a natural degenerative process incidental to advancing age. Attempts have been made to lessen the tendency to degeneration by strict rules of life.

DIET IN PULMONARY EMPHYSEMA.—Doubtless excess in diet tends to hasten the degenerative processes. Alcohol, in particular, should be taken in very small quantities, only with meals, and all sweet wines should be entirely avoided. Digestive disturbances must be corrected and the bowels regulated. Carbohydrates and fats must be limited, while nitrogenous foods may be taken with more freedom, provided the kidneys are sound. Patients subject to bronchial attacks frequently eat too much and become stout and plethoric, and this naturally increases their troubles. Dyspnea is readily experienced, and the muscles of the heart may degenerate. Pulmonary congestion follows, requiring greater respiratory effort, with increase of the emphysema. Smoking should be rigidly restricted, or better, altogether forbidden. Attacks of indigestion are common in this form of emphysema; flatulent distension of the stomach and bowels adds considerably to the patient's discomfort, as the dyspnea is easily aggravated. The possible existence of a gouty diathesis must not be overlooked, and if discovered, must be treated by dietetic measures.

Gilman Thompson warns against the ingestion of condiments, sauces, fried and greasy foods, and of all obviously indigestible articles. In his opinion, fluids should not be taken with solid food, and be always used in moderation. Water may be drunk an hour before meals, but not for three hours after. In the early stages a nourishing diet, consisting chiefly of animal food, fish, milk, cream, eggs and good butter, should be ordered. If dyspnea predominates, with frequent asthmatic attacks, it is advisable to substitute milk largely for other foods, and in the later stages, with a feeble heart and increasing congestion of the abdominal viscera, the diet should consist wholly of milk and meat broths. Cod liver oil is an excellent food in emphysema.

While emphysema is not very amenable to direct treatment by means of diet, the comfort of the patient will be maintained by a régime similar to that described in connection with chronic bronchitis. The main

object of the dietetic treatment of emphysema is, as in bronchitis, to avoid creating indigestion and especially flatulent distension of the abdomen.

Empyema.—The dietetic treatment of empyema is grounded upon the need to nourish a system debilitated by the constant excretion of purulent matter. Fatty foods, as butter, olive oil and cream, should form a large part of the dietary. In a general way the diet prescribed in the early stages of pulmonary tuberculosis is well suited to empyema.

Hay Fever.—All that can be said with respect to the dietetic treatment of hay fever is that, as a rule, it is an acute febrile affection which does not call for any special dietary measures except when associated with asthma. In that case the treatment prescribed for asthma is indicated.

Pleurisy.—The so-called "idiopathic" pleurisy is usually the result of tuberculous infection, and therefore the lowering or depleting treatment of the past is positively contra-indicated. As in pulmonary tuberculosis, fresh air and proper nourishment promote recovery. The diet should be light but ample. The menu may be selected from the following: Beef, chicken, broths, bread, rusks, biscuits, butter, milk, eggs, milk puddings, sole, whiting, oysters, potatoes, or other light vegetables and occasionally a little fruit, such as grapes or oranges. Tea, coffee, cocoa, home-made lemonade or orangeade are allowable as beverages, but stimulants are not necessary or desirable.

DIET IN ACUTE PLEURISY.—In acute pleurisy the ordinary diet for a febrile illness is to be employed. Such a diet will be fully considered when the section on febrile affections is reached. When effusion has taken place, more special treatment is sometimes carried out. The two principal methods advocated are: (a) To give the patient a dietary as dry as possible (*see* Volume II, Chapter XVI, "Special Diet Cures," p. 561), that is to say, the fluid elements reduced to a minimum in order to check further effusion and to promote absorption of the fluid. Generally speaking, this mode of treatment is extremely irksome to the patient, and the results do not seem to justify the trouble involved. As Sutherland points out, in the case of pleurisy, one is dealing with an active inflammatory process, and an excess of secretion goes on despite a limited fluid intake. In cases of chronic effusion, after the subsidence of active inflammation, the fluid can be removed much more quickly by other measures, and with much less discomfort to the patient than by deprivation of fluids and fluid foods. Certainly, it is not wise to encourage a large fluid intake on the part of a patient during the stage of effusion, but rather the amount of fluid should be given in strict moderation. According to Friedenwald

and Ruhräh, it has also been recommended that common table salt be taken in large quantities, on the principle that, owing to the increased density of the blood, a more rapid absorption will take place. (b) The second plan, advocated mainly by some French writers, is to place the patient on an exclusive milk diet. This method is said to increase the excretion of urine, and also to aid in the absorption of the effusion. A salt free diet, although it may be useful in certain cases of renal edema, cannot be regarded as a remedial measure of value in pleural effusion.

TUBERCULOSIS

The chief indications in the dietetic treatment of pleurisy with effusion are to keep up the patient's strength by as full a diet as the state of the temperature and digestion will permit. The return to a general diet should be gradual. Perhaps the following rule is as good as any. If there is fever or complicating kidney or heart disease, the milk diet is to be preferred. If there are no such complications and fever is absent, ordinary diet with a lessened amount of fluids should be prescribed. No soups, but little coffee, tea or other beverages, and as small an amount of water should be allowed as the patient can comfortably tolerate.

Symptoms of Tuberculosis.—Referring to the early symptoms of pulmonary tuberculosis, and to their toxic origin we quote from von Ruck (4) as follows: "Tuberculosis in its initial stages is often referred to as 'going into a decline.' The pallor of the skin and of the visible mucous membranes is occasionally sufficiently marked to attract the attention of the trained medical man. This pallor constitutes one of the earliest symptoms of tuberculosis. It is most frequently observed in adolescents and young adults, and by the older practitioners was looked upon as a bad omen. An examination of the blood, including hemoglobin estimates, may give a normal report. When such is the case, the symptoms, no doubt, are due to vasomotor constriction brought about by the action of a toxin upon the sympathetic nervous system.

"A similar toxic origin offers, in our opinion, the most reasonable explanation for certain functional digestive disturbances, which consist in lack of appetite or in its capricious character, in symptoms of dyspepsia, in an unsatisfactory gain in weight and growth in children, or in a gradual loss of weight even when the digestive organs are apparently not disturbed and when the appetite is sufficient for the regular ingestion of a normal amount of food.

"The tired, languid appearance and the easily induced fatigue, disturbed sleep, the tired feeling on rising or after exertion, trophic anomalies of the skin, early decay of teeth, dilated pupils, headache, and other vague pains suggestive of neuralgia, myalgia or rheumatism, certain obstinate skin affections like acne or psoriasis, delay in the establishment of adolescence in boys and girls, and various other unexplained symptoms, are probably all phenomena of disturbed vasomotor function and suggest a toxic origin. We may also assume a similar origin for certain functional disturbances of the heart, especially in the early stages of tuberculosis, as manifested by an unduly rapid pulse and by paroxysms of cardiac palpitation. The theory of the toxic origin of these symptoms is supported by the observation that symptomatic and general hygienic measures are not followed by marked improvement. According to statements made frequently by patients, therapeutic measures had usually been instituted unsuccessfully before other symptoms appeared pointing to the existence of tuberculous disease.

"We are, of course, unable to say which of the several possible toxic products of the tubercle bacillus is concerned in the production of these symptoms. There is no reason why any of them could not cause toxemia, but as these symptoms usually appear at an early period, and often become manifest before a positive diagnosis of tuberculosis can be made, except with the aid of a tuberculin test, we are justified in considering the influence of the split products of a protein, or possibly even a toxin of non-proteid nature. A protein may be responsible which becomes available after the death of the bacillus, and owing to its ready solubility, may be the first to appear in the local tissue and become available for absorption into the circulation. The split or partially reduced products of a certain fraction of the bacillary toxin possibly differ individually in their toxic or irritative action upon the nerve-centers, and the state of reduction may affect the result.

"The lipoids of the tubercle bacillus, some of which we have found to be extremely toxic in animal experiments, are particularly noteworthy in this connection. They are the least soluble in the body-fluids, and become specially available with the softening of caseous tubercle or with the entrance of tubercle bacilli or of their fragments into the circulation. If we are correct in this respect, the relation of the lipoids or of their split products to the fever would be of additional interest, in view of the therapeutic results which have been claimed for various drugs which are solvents for fats, like alcohol, ether, chloroform, and because the liberation and absorption of the lipoids in the organism is possibly favored by the

administration of these agents at an earlier period, before the organism has acquired any or only traces of specific protective substances. Our interest has not been directed to the lipoids on account of the supposed value of alcohol or of other fat-solvents in the treatment of tuberculosis, but is based upon certain toxic and biological phenomena which we have observed repeatedly, and which may in time be explained otherwise. The point is of interest on account of the extensive use of alcohol, often by experienced clinicians, in the treatment of tuberculosis."

Pulmonary Tuberculosis.—The wasting associated with incipient pulmonary tuberculosis is due to an insufficient appetite, and in the active stage of the disease, to a breakdown of nitrogenous tissues by the bacterial toxins, as in other infective diseases. The ingestion and absorption of a liberal allowance of wholesome nutritious food will aid in combating the disease.

DIET IN PULMONARY TUBERCULOSIS.—Diet is, of course, of the utmost value in the treatment of pulmonary tuberculosis. The answer to the question as to the proper kind of diet for consumptive patients, is fairly unanimous among those best qualified to judge. Food of a nourishing character, a generous diet composed of judicious proportions of meat, fish, eggs, dairy produce, bread, vegetables and fruits, is considered quite as important as a plentiful supply of fresh air in the successful treatment of the disease. With special reference to the diet of the consumptive, however, the above statement requires certain qualifications. The feeding of phthisical patients, said to have been originated in certain German sanatoria upon the theory that the particular kinds of food were less relevant dietetically, than were the largest possible quantities of food consumed by the consumptive patients is an overdrawn statement of facts. We read of marvelous amounts of food said to have been consumed by individual patients for weeks and months and of remarkable gain of body weight which such patients made during such a course of feeding. Much of this is erroneous and although some ten or fifteen years ago hyperalimentation was favored, by many physicians in all countries, and an excess of food over that required in health is still deemed advisable, so long as increase in weight is desired, few sanatoria ever adopted forced feeding in the sense that the more the patient could consume the better was his recovery assured. Such a course would sooner or later force the physician advising it, to individualization in the light of the digestive and assimilating capacities of his patients and speedily so, in instances in which these functions were limited and impaired by their being in a state of disease. The fact that intact digestive organs are one of the chief assets for eventual

recovery of the tuberculous or consumptive patient is now so generally recognized that few physicians would care to take the risk of their impairment by taxing them beyond a degree of safety. It is more particularly through the modern sanatoria that this rational attitude has become generally accepted as the correct one.

Bodington, one of the pioneers of the sanatorium treatment in Great Britain and in the world, writing in 1840, says that "to restore a consumptive patient, it will be necessary to give him frequent supplies in moderate quantities of nourishing food and wine; a glass of sherry or Madeira in the forenoon, with an egg, another glass of wine after dinner, fresh meat for dinner, some nourishing food for supper, such as sago or boiled milk, according to the taste or the digestive powers of the patient." Stokes of Dublin, a very eminent authority of his day, held the opinion that the diet of incipient curable phthisis must need be of the most nourishing kind, such as milk, farinaceous substances and light vegetables. The fever, however, was to be met by antiphlogistic medication, and the low diet was the complement of therapeutic measures such as venesection, leeching, issues and the administration of lowering drugs, like tartar emetic. The entire diet was calculated to lessen the acrimony of the humors. For this purpose, the patient was kept chiefly on a lacto-vegetarian diet. Milk alone is of more value in this disease, declared Stokes, than the whole *materia medica*. Asses' milk was considered specially valuable, and in some cases woman's milk was ordered as the best food for adults. Graves, who boldly stated that he "fed fevers," entered a protest against the lowering methods in vogue for treating consumptives. He, with common sense, proclaimed that the consumptive invalid must not be treated by semi-starvation, but needs plain, wholesome food. "Make your patient," he said, "lay aside slops and tea; let him take wholesome, fresh meat, bread and good beer."

Gradually but surely—for old ideas always die hard—the position was reached that a full and wholesome diet is indicated in all forms of tuberculosis. Perhaps the pendulum has swung too far in the opposite direction, for overeating is now recommended by many authorities as the best form of dietetic treatment for consumptives.

It has been pointed out by Irving Fisher(5) that in the absence of definite data with regard to dieting the practise of physicians in this respect has varied and still varies very widely. This author collected statistics of diet prescribed for consumptives in Sanatoria, and presented them at the annual meeting of the National Association at Washington in May, 1906. Fisher's collective inquiry included 95 of the leading Sanatoria

in the world, of which 63 were in the United States, 2 in Canada, 13 in Germany, 11 in Great Britain, and the remainder in France, Austria, Norway, Switzerland and Russia. "Very few," he said, "supplied any measured data; in most cases the statement of the food consumed was given only in a general way."

In regard to the question of the quantity of food consumed, Irving Fisher found that of 64 sanatorium physicians, 28 were distinctly in favor of the system of forced feeding, and 20 were distinctly opposed to it. The table of measured diets shows that the dietaries range all the way from 2,100 to 5,500 calories. Fisher, commenting on these facts says, "Naturally, not all of these standards can be correct, and if we are to believe that there is any virtue in physiological economy, we must conclude that those sanatoria which use the lowest standards consistent with weight gaining must be on the right track." The author draws attention to the importance of individualizing the diet. He states that this necessity for individualizing was emphasized in many of the replies, though oddly enough, some who most emphasized the necessity for individualizing the diet, urged it as an argument against a measured dietary. It is, of course, true that if an accurate adjustment of diet to individual needs is to be sought, even greater importance attaches to the measurement of diet than would be the case if a single diet would suffice for all patients. In conclusion, Fisher sums up the question of the dieting of consumptives in the following words: "There is as yet very little known with certainty as to the most efficient diet in the treatment of tuberculosis or the extent to which this diet should be individualized. In order to determine either the standard or the individual diet, much study and accurate observation are needed."

Modern Methods of Treatment.—In the modern methods of treating consumption in its progressive stage, the main efforts aim at improving the patient's nutrition. If the patient does not assimilate food, the wasting of the tissue due to the disease cannot be successfully combated. It is largely with this object in view that a constant supply of fresh air is a *sine qua non* in treatment, in order to stimulate appetite and to increase metabolism. Under ordinary conditions, the patient continues to lose flesh and his appetite is deficient. Left to his own resources, he does not eat enough to repair the waste. The difficulty is to induce such patients to ingest an adequate amount of food. This problem calls for infinite tact, judgment and resourcefulness on the part of the physician, and is the excuse for forced feeding. Unquestionably, a consumptive living under good hygienic conditions is able to digest, absorb and assimilate a good

deal more food than he is willing to eat. However, there is a difference between persuading patients to eat and compelling them to overeat. Over-eating upsets the digestion, which is frequently weak in consumptive individuals, and would appear to be contrary to sound physiological principles.

At the Nordrach sanatorium, where overfeeding is carried to the limit of tolerance, the diet of the patients is described by a former house physician of the Brompton Hospital for Consumption, as follows:

One of the main features of the treatment is a regular course, from first to last, of overfeeding with a rich and varied diet, including much meat, milk, fatty and farinaceous foods, given in large quantities at a time, with long intervals between the meals.

Three meals are given in a day: *Breakfast*, at 8 A.M., consists of coffee, bread and butter, and cold meat, such as ham, tongue, sausage, etc., and a half liter of milk. This after a time is reduced to a quarter liter, according to the patient's capacity and need for putting on flesh. *Dinner*, at one o'clock, consists of two hot courses of meat, or fish and meat, about four to six ounces being served to each patient, with plenty of potatoes and green vegetables, and sauces in which butter is the main ingredient. The third course may be pastry, or farinaceous pudding, fruit and ice-cream, with coffee and half a liter of milk. *Supper*, at seven, usually consists of one hot meat course as at dinner, and one cold as at breakfast; tea and a half liter of milk. The two latter meals must be taken under the supervision of the resident physician.

The clinical results at Nordrach at that time showed clearly enough that the use of the above diet in the treatment of consumption was attended with a considerable measure of success. This mode of treatment was copied in sanatoria in various parts of the world and gain of weight came to be the chief aim of physician and patient; the greater and more rapid the gain, the better pleased were both parties.

To this desired gain of weight must be attributed much of the over-feeding which is still practiced in certain sanatoria. We agree with Mackenzie, "that under judicious feeding, the patient's weight should be gradually brought up to the normal standard. To go beyond this, and so to possibly turn what is called a genteel figure into one resembling that of a portly overfed alderman, is neither common sense nor sound practice. Tuberculous subjects, it would seem, are more readily fattened than the non-tuberculous, but gain in weight is not always a sign of improvement in other directions. The dietary must be modified according to the patient's condition. The amount and kind of food suitable for a lean, emaciated subject may be positively harmful for one who is already too corpulent."

The following is the diet of a patient treated in the Sanatorium Ward of the Sheffield Royal Infirmary in 1899:

E. T., age 27; occupation, typefounder.

Type of Malady—Extensive disease of upper and lower lobes of the right lung, with excavation at the apex and infiltration of the lower lobe.

Duration of Disease—Three years, with periods of more or less complete arrest.

Condition on admission—General health poor. Fever, 99° F., A.M., to 100° F., P.M. Appetite and digestion poor. Weight, 107 lbs., or 18 lbs. below normal weight when in good health.

This patient for the first three months of his treatment took the following diet daily: milk, 980 c.c.; bread, 260 gms.; sugar, 80 gms.; butter, 42 gms.; one egg; cooked chicken, 120 gms.; oatmeal, 30 gms.; cooked rice, 125 gms.; jam, 70 gms.; treacle, 35 gms. Nutritive value of the diet: protein, 102 gms.; fat, 87 gms.; carbohydrate, 391 gms. His daily intake of nitrogen on this diet was 16.32 gms., of which 95 per cent was absorbed, and 87 per cent reappeared in the urine. Clinically he made some improvement, but not enough to be really satisfactory.

In view, therefore, of his progress not being very rapid, his diet was increased, and for the next three weeks he took the following daily: milk, 2,100 c.c.; bread, 290 gms.; sugar, 110 gms.; butter, 57 gms.; egg, 1; cooked chicken, 160 gms.; oatmeal, 37 gms.; jam, 58 gms.; treacle, 50 gms. Nutritive value of the diet: protein, 159 gms.; fat, 150 gms.; carbohydrate, 530 gms. Energy value, 4,106 calories.

For three weeks he took this largely increased diet, but with great difficulty; in short, his treatment might be very well described as "stuffing." He took a very long time over his meals, and suffered steadily from increasing anorexia and dyspepsia. He increased rapidly in weight during the three weeks he took this diet, gaining on an average four and one-half pounds a week. During the third week he commenced to vomit and suffered also from diarrhea. At the end of this week, the large diet was discontinued. It was impossible to detect any appreciable improvement in the lung condition, but his general health, especially his digestion, suffered materially. With the increased diet his daily intake of nitrogen had risen to 25.49 grams, of which 93 per cent was absorbed and 58 per cent reappeared in the urine. There was also a marked rise in the excretion of indican, the result of intestinal derangement.

During the remainder of his period of treatment he was given a diet with a nutritive value between the two diets described. On this diet he made satisfactory progress. He was discharged in his sixth month of treatment, with a normal temperature and a very much improved appetite and digestion. His general health and his lung condition were also very much better. It is stated that this patient, on account of his treatment with a large diet, led them to make some observations upon the metab-

olism of forced feeding. These observations were not published, but although incomplete, they gave clear evidence that the digestive system and the general body metabolism were injuriously affected by the high feeding, although the improvement in the condition of some patients, namely, arrest of the tubercular process and gain in weight and strength, might be satisfactory enough.

The question arises as to whether this strain on the digestion and metabolism is of necessity associated with the generous dieting essential to the treatment of pulmonary tuberculosis. The conclusions drawn by Bardswell and Chapman, who in conjunction with Dr. Goodbody investigated the effects of ordinary large and very large diets on tuberculous patients at the Brompton Hospital for Consumption, are as follows:

(a) The patients made very satisfactory progress, both clinically and experimentally, when the ordinary diets first prescribed were somewhat increased; in short, when treated with moderately large diets.

(b) These comparatively large diets were especially well borne by patients much below their weights. They did not give such satisfactory results in patients of normal weight and with arrested disease. The patients made much less satisfactory all-round progress on the large diets of considerably smaller nutritive value.

(c) Weight was gained in nearly every case, in some to a very large extent and very rapidly, but this gain of body weight was not associated with any more satisfactory progress in the tubercular lesion than was obtained with the smaller diets; on the other hand, the general health suffered considerably, as indicated by failure of appetite, marked digestive and intestinal derangements, and, in one case, vomiting.

(d) In spite of the fact that the clinical conditions of the patients observed were widely different, and that the digestive system in at least two of the patients was obviously impaired, the digestion and absorption of both nitrogen and fat were uniformly good, even in the case of patients with high fever. The absorption of fats was excellent, although very large quantities were sometimes given; *e.g.*, with an intake of 231.3 gms., 94.4 per cent was absorbed.

(e) It was noticeable that the patients complained least of digestive discomfort on the diets that gave the best results experimentally.

(f) With regard to the nitrogen: when the amount of protein in the diet was much increased, it resulted in (a) an increased excretion of nitrogen out of all proportion to the increased amount retained in the body; (b) a diminution in the percentage of nitrogen excreted as urea, and consequently an increase in the percentage amount excreted in a less oxidized form; (c) diminution in the percentage of nitrogen absorbed; (d) an increase in the amount of aromatic sulphates excreted, indicating increased intestinal putrefaction.

Conclusions as to Overfeeding.—Similar observations were made in forced feeding of normal individuals who gained weight rapidly, but this

gain was associated with marked impairment of the general health. Over-eating in health is always injurious and will lead in course of time to diseases of a serious character. This point has already been sufficiently emphasized. The case of the consumptive is vastly different, and the matter of feeding normal individuals and those suffering from tuberculosis does not permit comparison. The following is a summary made by Bardswell and Chapman with respect to the advantages and disadvantages of very large diets for consumptives. The routine treatment of consumption with diets of a very high nutritive value is very often associated with most satisfactory clinical results, as evidenced by arrest of the tubercular process and restoration of health and strength, although this method of treatment results in a considerable strain of the digestive system and the body metabolism. In the case of patients with good constitutions, especially good digestion, continued high feeding may produce no permanent or no temporary ill effects, except some dyspnea due to excess of body weight. Although such a patient becomes too fat, his digestive and excretory organs successfully cope with the strain imposed upon them. On return to ordinary life, on completion of his course of treatment, such a patient loses a good deal of his excess weight and the net result is satisfactory enough. In many instances, however, and notably in the case of patients with naturally weak digestions, and in those who continue the high feeding for a long time after the normal body weight has been well exceeded, the taking of a very large diet is attended with very serious disadvantages. One of the earliest symptoms is a failure of appetite, amounting to a positive loathing of food, usually associated with flatulent dyspepsia. To impair a consumptive's appetite and digestion by over-feeding is obviously as unwise a course as can be imagined. Destroy the sheet anchor of the consumptive, his digestion, and you are doing him an irreparable injury. His chances of recovery are immeasurably lessened. As a matter of interest, it may be stated that the proportion of all consumptives who have normal digestive systems when they first come under treatment is about 60 per cent; the remaining 40 per cent usually have some degree of impairment.

In short, the work of Bardswell and Chapman, Von Ruck and many other authorities appears to have very clearly demonstrated the injurious effects of very large diets, showing that in a general way the most satisfactory diet for the patient is one which represents only a moderate extension of the diet suitable for him when in normal health. According to Dr. David Lawson (6), consumptive patients usually gain weight on a full nourishing mixed diet with a liberal allowance of carbohydrates, fats and

milk. Two practical points are as follows: During the febrile stage of the disease, provided the patient's digestion is sound, the food ought to be pushed almost to the stuffing point. When patients approach their top weight, which generally is from 7 lbs. to 14 lbs. above their highest known weight, the rate of gaining falls to very small amounts. The digestion is apt to give trouble, which is an indication to reduce substantially the amount of food taken. The milk may be reduced to half the usual allowance. This reduction serves not only to prevent the threatened digestive breakdown, but the patient continues to gain in weight and feels much better than when on the full diet. Friedenwald and Ruhräh say that the aim should be to cure the patient and not make of him what some one has termed a flabby, breathless, inert mass. A smaller diet, well digested and assimilated, is much better than overfeeding. Hyperalimentation may be used in certain cases under supervision, but often leads to gastric and intestinal irritability with vomiting and diarrhea, foul breath, coated tongue, drowsiness, headaches, and sometimes an objectionable obesity.

A recapitulation of the arguments against superalimentation in the treatment of consumptives is superfluous. It suffices to state that clinical evidence does not bear out its efficacy, but rather indicates that it is bad treatment in the vast majority of cases. Overfeeding is assuredly better adapted to the dietetic treatment of consumptives than underfeeding, but the best of all methods is the study of the individual patient, in order intelligently to outline a suitable dietary.

General Principles of Diet.—Concerning the general principles with regard to increase of protein, fat, carbohydrates and caloric value, the consumptive patient needs a more generous diet than is physiological for him when in ordinary health. Should this increase be in protein, fat or carbohydrate? Many experienced clinicians who have made a close study of this subject favor an increase in protein sparsers, especially, in fat, while others advocate a relatively large increase of all the ternary food elements. Bardswell and Chapman as the result of wide experience have decided that the morbid process clears up better and general health improves more rapidly when patients are treated with diets richer in protein than those usually taken in health. In their experience, a diet containing no meats, the protein being given chiefly in the form of milk, pulse and oatmeal, with a negligible amount of the extractives abundant in meat, equally satisfactory results were obtained as with protein, chiefly in the form of meat. This result suggests that the extractives exert little or no favorable influence. Protein, of course, exerts a stimulating effect upon the general body metabolism, and in this way tends to improve the gen-

eral nutrition, perhaps accounting for the value of an increased protein intake in the treatment of tuberculosis. One hundred and fifty grams of protein daily produces the best results, both from the clinical and metabolic standpoint. Bardswell and Chapman conclude that the increase in any individual case should be some 25 to 30 per cent on the amount of protein contained in his physiological diet, and this on the average works out at some 150 grams a day.

An increased intake of fat and carbohydrates has been more urgently requested than an increase of protein material. These energy-giving foods are usually given to consumptives in the form of milk, which means that a considerable increase is at the same time made in the amount of protein. In a very large proportion of cases of tuberculosis, it is eminently advisable to increase the amount of energy-giving foods, particularly when the temperature is high or the weight much below normal. Fat, being less bulky than carbohydrate, is more readily taken, and for this reason is rightly regarded as a more or less essential item in the dietary of a tuberculous patient. Consumptives readily absorb fat, in a general way, but an excess of energy-producing foods is harmful. An excessive amount of fat and carbohydrate results in too much body weight, with its associated flabbiness, poor muscular tone and so on.

It is practically impossible to lay down definite rules with respect to the desirable increase in fat and carbohydrate, as this largely depends upon the amount of exercise the patient is able to take, as well as on other considerations. On the average, the tuberculous patient at physiological rest appears to do best upon a diet which represents an increase of 30 per cent in total caloric value over his physiological diet. Patients ingesting 150 grams of protein daily, gain weight at a very satisfactory rate. Tuberculous patients making good progress towards recovery, with quiescent lesions, and able to do a certain amount of manual labor, may, with advantage, ingest a dietary with a caloric value up to 4,500 grams. The weight of a patient is a "rough and ready" and fairly reliable index of his condition. The kind and amount of food may be altered, increased or reduced, just as he or she is retrogressing or progressing.

REPRESENTATIVE DIETS.—The general principles for the dieting of the tuberculous are summarized as follows by Bardswell and Chapman:

1. The amount of protein in the physiological diet should be increased by 30 per cent, and this increase should be maintained until the disease is obsolete.
2. If the patient is under weight, the physiological diet should be increased 30 per cent in the purely energy-giving foods, namely, either in fats or carbohydrates, or partly in each. This increase should be maintained until the weight

becomes stationary at a point a few pounds in excess of the patient's highest known weight before becoming infected with tuberculosis. Then a decrease of 15 per cent may be made, and the diet thus altered should be continued until the disease is obsolete. Individual and class habits will determine the relative amounts of fat and carbohydrate prescribed.

3. Patients with constitutional disturbance associated with anorexia or dyspepsia usually require a somewhat concentrated diet, so as to give the comparatively large amount of nourishment in a but slightly increased bulk of foodstuffs.

4. The food should be well cooked, the meals varied, and given as far as possible at considerable intervals, and reliance should be placed upon plain foodstuffs whenever possible; invalid food should only be used when ordinary foods cannot be taken. Hector Mackenzie emphasizes this latter point, saying that it is very important to rid ourselves of the notion that the average consumptive patient requires an altogether different diet from that of a healthy person. Such is by no means the case. All ordinary foods may be taken and can be digested.

5. Leyden strongly deprecated the senseless and widely prevalent use of artificial food products, which are, as a rule, unnecessary. As an example of the dietary considered suitable for patients of the hospital class, see dietary in use at the Brompton Hospital for Consumption.

The following dietary is in use at Rupertshain in one of the German sanatoriums for the poorer classes:

DAILY DIETARY AT RUPERTSHAIN SANATORIUM

Breakfast—8.30 A.M.

2 cups of café au lait, or cocoa, or 1 pint of milk; bread and butter.

Second Breakfast—10 A.M.

1½ glasses of milk or gruel; bread and butter; sausage, ham, or meat sandwiches.

Dinner—1 P.M.

Soup, meat, greens and potatoes; small bottle of beer; sweets on Sunday.

Tea—4 P.M.

Coffee, or pint of milk; bread and butter.

Supper—7.30 P.M.

Soup, chop or cutlet, sausage, herring or cheese; potatoes; small bottle of beer.

Second Supper—9 P.M.

Glass of milk.

The formulation of a standard diet for consumptives is very difficult, owing to a variety of reasons.

Bardswell and Chapman, in order to compile a standard diet suitable for the treatment of the average adult suffering from pulmonary tuberculosis, have worked out the average nutritive value of the diets taken by 200 of the patients at the Brompton sanatorium, who made very satisfactory progress. In the analysis, the diets taken by the men and women

patients have been considered separately, and from them has been calculated the standard diet for each sex respectively. The 200 patients by whom these diets were taken, represented many types of tubercular disease both as regards the exact nature of, the extent of, and the severity of the morbid process. The nutritive value of the average diet taken by the men patients worked out approximately 150 grams of protein and 3,200 calories daily; the average diet taken by the women at 128 grams of protein and 2,700 calories. Such are standard diets, which, of course, require modification in individual cases. A big man or woman will require more protein, and about two times more carbohydrate than protein. With persons suffering from active tuberculosis, the standard dietary on page 209 may be considered the minimum diet.

Dr. H. M. King of the Loomis Sanatorium, in his paper, "Diets in Tuberculosis" (7), describes his observations as follows:

With a view of establishing a working diet, so to speak, for certain classes of tubercular invalids, the following experiment was recently made at the annex of the Loomis Sanatorium. Twelve patients, equally divided as to sex, were selected with reference, first, to similarity of conditions, all but one with quiescent or arrested lesions, and that one with but a moderately active lesion. Secondly, with reference to similarity of weight, the men averaging 11 or 12 kilos more than the women; and thirdly, with reference to a close approach of each patient to his or her normal weight. In all but one case, the patients were but slightly below the indicated standard; nevertheless, their appearance was that of a very well-nourished group of individuals.

These patients were placed at a table by themselves, and their food, while not differing from that of the other patients, either in quality or quantity, was accurately weighed and recorded for a period of fourteen days. The average diet taken by these patients throughout this period worked out at 166 grams protein, 179 grams fat, 322 grams carbohydrate, with a caloric value of 3,667.

King, however, is of the opinion that the protein constituent of the dietary was in excess of the tissue needs, and that, perhaps, an unnecessary and harmful tax was thus imposed upon the organs concerned in protein metabolism and elimination.

Drs. Goodbody, Bardswell and Chapman concluded as the result of their carefully conducted investigations that the most suitable diet for the average adult consumptive consists of about $4\frac{1}{2}$ ounces of proteins, 5 ounces of fat, $10\frac{1}{2}$ ounces of carbohydrates. Voit's standard dietary for a man at ordinary work is about 4 ounces of proteins, 2 ounces of fat and 16 ounces of carbohydrates; thus for the average consumptive the proteins are increased to some extent, the consumption of fat more than doubled, and the carbohydrate consumption considerably decreased.

Burton Fanning, discussing the subject of diet in "The Open Air Treatment of Pulmonary Tuberculosis," (1905), gives the following as a standard dietary:

	APPROXIMATE VALUE	
	Protein	Fat
Meat, 5 oz.....	1 oz.	$\frac{1}{2}$ oz.
Milk, 3 pints.....	2 oz.	$2\frac{1}{2}$ oz.
1 egg, 2 oz.....	$\frac{1}{4}$ oz.	$\frac{1}{8}$ oz.
Porridge, plateful.....	$\frac{1}{3}$ oz.	
Butter, 2 oz.....	Trace	$1\frac{1}{2}$ oz.
Potatoes, etc., 4 oz.....		
Puddings, plateful.....		
	<hr/> 4 $\frac{1}{2}$ oz.	<hr/> 4 $\frac{1}{2}$ oz.

ADVANTAGES OF THE STANDARD DIET.—Although no accurate and definite rules can be formulated for dieting patients with pulmonary tuberculosis, as a standard dietary for the average adult consumptive, that of Bardswell and Chapman appears to have met with the approval of the great majority of English authorities. No specific diet has been as yet evolved which will meet the needs of each and every case. Tuberculous patients, like others who are underfed, require a supply of good food and they usually require more of it.

In tuberculosis, as in most diseases, the personal equation is of more consequence than the disease, and individualization of diet is the keynote of successful treatment. We may know just what the caloric value of a food is, and yet such a food may not suit. Beefsteak is well adapted to the needs of one person with tuberculosis, but not to another afflicted with the same disease. Eggs agree excellently with some consumptives and disagree with others. Personal idiosyncrasies exist concerning most articles of diet. The question of race and habits must also be taken into consideration. The German may prefer sausage while the Scotchman pins his faith to oatmeal. The Italian will turn up his nose at Irish stew and the Irishman will object to eating spaghetti. The Frenchman likes made-up dishes, the Englishman favors cuts from the joint, and so on. A person out of health is fastidious and capricious with regard to his food, and the consumptive perhaps especially so. Food that is relished by the individual, and nicely served, will be eaten with more gusto, and will tend to tickle the palate and arouse the appetite more than a compulsory dietary.

Monotony in diet is to be avoided, for nothing is more apt to create a distaste for food than the placing the same dishes prepared in the same

way before an invalid day after day, and insisting that he eat regardless of appetite or personal tastes. Variety in diet is strongly indicated in the treatment of consumptives and is probably of equal importance with caloric value.

Barring a few exceptional cases, forced feeding and an excess of food are not calculated to yield satisfactory results, and clinical evidence founded upon long experience seems to warrant the belief that the standard dietary will benefit a large proportion of those suffering from pulmonary tuberculosis. The diet prescribed for patients with tuberculosis should differ but little in its constituent parts from the diet of persons in ordinary life. But in order to construct a standard diet from the foods generally eaten, it is necessary to know the percentage composition of the various foodstuffs contained in it (*see* Volume III, Chapter XXVIII).

MILK IN PULMONARY TUBERCULOSIS.—Of all the foods employed in the treatment of tuberculosis, milk is usually allowed at once, as one of the most valuable and the most universally employed. Milk contains all the different elements which go to maintain the body. The inclusion of three pints of milk in a patient's daily dietary means that a third of the necessary protein and caloric value is thus supplied. Milk indeed was mentioned by Aretus in the treatment of phthisical patients. It is easily administered, can be arbitrarily increased or decreased, and is or can be made easy of digestion. Some persons have an idiosyncrasy against milk. It must further be borne in mind that it is not an essential constituent of the diet, especially in the treatment of patients who have normal digestions and are able to take solid food. In fact, such patients do better without taking too much fluid, for their digestive organs are kept up to the mark by performing their functions on the well-masticated insalivated food taken, whereas an oversupply of pappy and fluid foods leads sooner or later to digestive disorders. That milk is by no means a necessary part of the diet is also illustrated by the fact that the omission of milk from the dietary does not prevent the patient from doing very well, provided the nutritive value of the diet is kept up to the required standard. Undeniably milk is an extremely valuable, in certain stages of the disease almost indispensable, form of food for the consumptive.

Pottenger(8), a great believer in the efficacy of milk for the tuberculous, says that when patients imagine they cannot take milk, and the physician has satisfied himself that it is only a notion, the idea may be overcome by the following plan—half an ounce to one ounce is first prescribed to be taken at one time, then every other day the addition of another half ounce is ordered. If there is no idiosyncrasy to milk, the patient soon

recognizes the absurdity of his position and is willing, as a rule, of his own accord to fill up the glass. Thomas D. Coleman, writing on tuberculosis, says that milk, fresh and pure or in various modifications, is of the greatest value in many cases of tuberculosis. When there is hyperacidity and the milk forms large curds in the stomach, a little lime water added to it will overcome the difficulty. In other cases, milk diluted with an equal part or a third of Vichy, or ordinary carbonated water, will be tolerated when plain milk will not. Similarly, buttermilk is not only more palatable to some, but is more easily digested, and kumiss, matzoon and milk artificially fermented with "lactobacilline" are all varieties of milk to be considered and recommended as the case requires. Strümpell says that if pure milk is not readily taken, we may try the addition of coffee, tea, common salt or brandy. Lawrason Brown(9) says that in the treatment of the chronic fever of tuberculosis, idiosyncrasies should be given due regard and the patient forced to eat nothing he has an antipathy for, with the exception of meat, eggs and milk. In all cases, a glass of milk or an egg should be given at night if the patient awakes. This is said to prevent the subnormal temperature, although it does not do so in all cases.

Use of Skim Milk.—When whole milk cannot be afforded, skimmed or separated milk provides a fairly adequate substitute. While whole milk is more palatable than either of the above varieties, separated or skimmed milk is not so disagreeable as to contra-indicate its use as a beverage, although it is best employed for cooking purposes. The difference between puddings made with whole milk or separated milk can hardly be detected. Oatmeal porridge, cocoa and most dishes cooked with milk can be made with separated milk. In the food of consumptives, skimmed milk has the obvious drawback that it is bulk for bulk of lower nutritive value than whole milk. Bardswell and Chapman point out that in persons of poor appetite, the fat deficiency due to separation can be easily made up by the use of an equivalent amount of margarine, which for cooking purposes is quite as satisfactory as butter and less expensive. A gallon of whole milk loses 168 grams of fat by the process of separation, and this 168 grams of fat costs in Great Britain about 16 cents; 168 grams of fat, in the form of the best margarine, costs about 6 cents. In other words, 10 cents per gallon is saved if separated milk with margarine is used in place of whole milk without affecting, in the slightest degree, either the nutritive value or the palatability, provided the materials are used for cooking only. This is useful to know, for in the case of the consumptive poor, the expense of milk is a consideration.

MEAT IN PULMONARY TUBERCULOSIS.—Meat is one of the most important constituents of the diet of the consumptive, although, like milk, it is not absolutely essential. Excellent clinical results have been obtained by treating patients upon entirely meat free diets, in which the protein was given in milk and vegetable foods. In a general way, meat should always be included in the dietary as one of the chief sources of protein supply. Moreover, meat free diets, though far cheaper than meat, are very difficult to render really palatable to one accustomed to eat meat once or twice a day. It is a question of race, habit, and to some extent climate; in the temperate zone, where flesh eating is customary, it is the best economy to include a certain amount of meat in the diet of the consumptive.

As for the amount of meat to be taken daily, nine to twelve ounces of fresh meat is a suitable proportion in the average standard dietary. A diet containing an excess of meat, that is, a larger amount than can be properly digested and assimilated, is as prejudicial to the tubercular as to the normal individual. The amount of meat taken must depend largely on the condition of the patient, his ability to take exercise in the open air, and the state of his digestive organs. In the ordinary course of events, it may be said that from nine to twelve ounces of meat purchased daily is a sufficient animal constituent of the average standard dietary of the consumptive. Lawrason Brown says with regard to meat that beef and mutton are to be preferred, and while the latter is more easily digested, the former proves from experience the better food.

ADVANTAGES OF RAW MEAT.—Rare meat is better than well done, and raw meat is held by some as the best, combining the maximum of useful results with the minimum of digestive effort. Raw meat (beef) may be given as scraped beef sandwiches, or, where the taste is disagreeable, in little balls, rolled in chocolate, as it needs no mastication. The muscle plasma, ordinarily termed beef juice, expressed from meat, raw or slightly and superficially heated, until gray on the outside, in a dry saucepan, is of considerable value. The meat should be as fresh as possible, and often the cheapest and toughest cuts—brisket, rump, etc.—yield the most juice. Richet and Hericourt, who first popularized the use of raw meat and its juice, under the name of zymotherapy, recommend that the meat be left in a small quantity of water, one-fifth by weight of meat, for two hours, then expressed and the juice from 500 to 3,000 c.c. be immediately taken. Slightly heating the meat increases the amount of beef juice, affects it very little, renders it more palatable, and permits of its preservation throughout the day.

Thomas D. Coleman is of the opinion that meat is most easily digested raw, so that it will be found that the raw beef sandwich is sometimes digested as the only form of solid food.

Gilman Thompson, pointing out that raw meat is extolled by many physicians, especially among the French, as possessing peculiar nutritive and even curative value for tuberculosis, thinks that it has yet to be demonstrated that raw meat possesses any advantage over rare steak or underdone roast beef beyond the fact that the scraping and mincing process to which it is usually subjected prepares it somewhat better for solution by the gastric juice.

Bardswell and Chapman have found raw meat to be very beneficial in some cases with marked dyspepsia or high fever; also in tuberculous enteritis, which is perhaps accounted for by the fact that raw meat is very easily and completely absorbed by the alimentary canal. When raw meat is prescribed, there is a certain amount of risk of introducing parasites.

Hector Mackenzie believes that meat, if possible, should always be well hung before it is cooked, and says that while beef and mutton comprise the principal kinds of animal food, we are often glad to avail ourselves of oysters and caviare, various kinds of fish, chicken, game, sweetbreads, etc. Special mention should be made of bacon on account of its richness in fat, in addition to its palatability and ease of digestion.

COD LIVER OIL IN PULMONARY TUBERCULOSIS.—With regard to certain auxiliary and artificial foodstuffs, cod liver oil, malt and oil, etc., may be regarded more in the light of foodstuffs than of drugs. Patients who are well fed, and who take an adequate amount of food, do not need cod liver oil. As a matter of fact, cod liver oil in its unsophisticated form has of late gone rapidly out of fashion. But, at the same time, the mixture of malt extract and cod liver oil has become very popular; this mixture is much cheaper than oil, but has only one-third of its caloric value. Bardswell and Chapman point out that cod liver oil, malt and oil, and so on, have a very distinct value, especially in private practice, as the amount of fat given can be readily increased by prescribing the oil as a medicine to be taken with meals. These oils possibly have a beneficial effect, quite apart from their food value, but nothing is definitely known regarding such properties. Lawrason Brown draws attention to the fact that cod liver oil and cod liver oil mixtures should never be given during warm weather nor when high pyrexia is present. Some emulsions are useful, and olive oil, which is readily taken by some patients, is valuable. Strümpell thinks that the employment of cod liver oil emulsion to the

amount of two to four tablespoonfuls is sometimes not inappropriate if well borne.

With respect to the employment of cod liver oil in pulmonary tuberculosis, Gilman Thompson presents the arguments for and against its use so forcibly and ably that it will be well to quote him at length:

The use of cod liver oil in phthisis should be determined by the condition of the digestive organs and the general nutrition of the patient. Wherever the digestion is fairly good, in the absence of gastric catarrh, the oil is of great nutritive value and it is usually well borne when properly administered. If there is much gastric catarrh or if the stomach is irritable and nausea is easily excited, persistence in the use of the oil will only make matters worse. It should be at least temporarily discontinued, though in the chronic forms of tuberculosis unaccompanied by fever, in which debility and emaciation predominate, cod liver oil is often well tolerated. Cod liver oil is on the whole more satisfactory for children than adults, particularly in cases of tuberculosis in which the bones or glands are enlarged.

The presence of diarrhea is to be regarded as a contra-indication to the administration of cod liver oil, but unless it is given in large quantities, the oil itself has very little if any laxative effect upon adults, and it may usually be continued in doses of a dram two or three times a day, with no ill effect. In fact, by improving the nutrition it may sometimes benefit the diarrhea. Ringer suggests that for this class of patients a teaspoonful or more of the oil given at night before sleep may be better borne than at any other time in the day. The statement is usually made that persons with phlegmatic temperaments, with dark, sallow complexions, derive more nutrition from cod liver oil than do others, but it is doubtful if it can be applied any more distinctly to cod liver oil than to other classes of food.

Commonly it is best to give the oil pure and uncombined if it can be tolerated. It may be given in capsules, although they are not always dissolved at the proper time in the stomach. In fact, the oil may be given in various ways to disguise the taste. Pottenger never finds it necessary to prescribe cod liver oil, but furnishes the fats in the form of milk, cream, butter, bacon and olive oil. Indeed, in the sanatorium treatment of consumptives, cod liver oil and the like are rarely used, as the necessary fats can be administered in far more palatable forms. Pancreatic emulsions of oil are sometimes given to aid digestion. Cod liver oil is not so largely used as formerly in the treatment of consumption, but there can be no doubt that when it is well tolerated it is a valuable adjunct. It and the emulsions and malt extract mixtures all have a place in treatment, but the pure and unadulterated cod liver oil is best. In private practice,

and in the home treatment of tuberculosis, especially of the poorer classes, cod liver oil, when it is well borne, is of distinct value.

ALCOHOL IN PULMONARY TUBERCULOSIS.—There is as great a divergence of views as to the merits of alcohol in the dietetic treatment of consumption as with regard to its value in disease generally. There are those who hold that it is a poison in any event, and would absolutely prohibit its employment. At the present writing, alcohol is not so widely or so largely employed as formerly in the treatment of tuberculosis. There was a time when the use of alcohol was looked upon as an essential part of treatment, and malt liquors, especially, in Great Britain, were administered somewhat freely to tuberculous patients. Opinions have changed considerably in this respect, and alcohol has been relegated to the background. As Tibbles says, it was formerly the custom to recommend large doses of alcohol, one-half pint of whiskey or brandy a day, on the supposition that it moderated fever, supported strength, diminished the waste of tissues, and promoted the absorption of fat. It is not now prescribed in large doses nor to all patients. Alcohol is a stimulant, promotes the absorption of fat, and affords heat and energy by replacing fat and carbohydrate. But it does not spare the tissues or prevent the wasting of the muscles. In so far as it encourages appetite and favors eating, its use may be beneficial. On the other hand, there is no doubt that the injudicious use of alcohol predisposes the individual to tuberculosis, or rather it so lowers his resisting powers that he is rendered peculiarly susceptible to infection by the germs of tuberculosis.

Thomas D. Coleman takes the view that while excess of alcohol is obviously highly injurious to the system by lowering vitality, it has been demonstrated beyond question that alcohol in moderation is a food and beneficial to the system. Alcohol is a negative food, and by its immediate oxidation saves certain tissues that otherwise would be expended in the life process. In moderate amounts, Coleman thinks that it stimulates the appetite, improves digestion, and diminishes the night sweats. Strümpell is of the opinion that the administration of alcohol in the treatment of tuberculosis should be unhesitatingly recommended, in form of moderate amounts of beer, for instance, particularly beer rich in extractive matter; perhaps also extract of malt, and porter. Small amounts of good wine, he thinks, may contribute to the improvement of the appetite and the general condition. On the other hand, he deems it useless, and in some circumstances harmful, to order large amounts of the stronger alcoholic beverages, such as port wine and brandy, as prescribed in many German sanatoriums.

Hector Mackenzie thinks that, although apart from its possibly harmful properties alcohol has a high caloric value, it is not an economical form of food. It is never a necessity in any but the last stages of tuberculosis, but has its uses when it enables a patient to take his food better, and there is no reason why those who have been accustomed to take stimulants in small quantities with their meals should not continue to do so. Except when prescribed by the medical attendant, stimulants between meals should be prohibited. At sanatoriums in Great Britain, stimulants are hardly ever taken, even at meal times, and much the same may be said of sanatoriums on this side of the Atlantic.

Bardswell and Chapman do not advise the inclusion of alcohol in a routine diet in a sanatorium for tuberculous patients or as a regular constituent of its dietary. Alcohol, in their opinion, is often of use, however, in the treatment of patients with considerable debility. A glass of Burgundy or some other good wine at luncheon and dinner often improves the appetite and aids the digestion of such patients; also in the case of people used to a certain amount of alcohol, it is sometimes advisable to allow small amounts at the usual times. A glass of beer at meals in place of milk can often be given to convalescent patients with advantage. Alcohol is often of great service in treating patients who are acutely ill, or considerably exhausted. In the experience of Bardswell and Chapman, brandy is the most satisfactory form in which to prescribe alcohol; in the treatment of night sweats, one-half to one and one-half ounces of brandy should be given in hot milk, and they state that not infrequently the taking of such a draught in the early hours of the morning will altogether prevent the occurrence of this symptom.

According to Loomis, if the exhibition of alcohol increases the temperature and the pulse rate, and is followed immediately by greater weakness, it is doing harm. While it is true that advanced cases of tuberculosis show great tolerance for alcohol, it does not necessarily follow that they are benefited in proportion.

On the whole, then, it may be stated that in the treatment of tuberculosis, alcohol does not rank as high as in the past; in fact, its use in this direction has fallen into some disrepute. Those who have been accustomed to its use may continue to take it in strictly moderate amounts at meal times. For the purpose of stimulating appetite, it has a certain value and is perhaps indicated in states of exhaustion and for the relief of night sweats. Alcohol exerts no markedly beneficial effect in the treatment of tuberculosis, and certainly is an entirely negligible quantity from the curative viewpoint.

Considerations to be Taken into Account in Tubercular Diets.—Diets prescribed to persons suffering from tuberculosis must conform as far as possible to their habits of eating in ordinary health. Race, climate and position in life must all be taken into account. The wealthy do not consume quite the same kind of food as the poorer classes. The manner of cooking and serving must be taken into consideration.

One-third, probably, of all suffering from tuberculosis do not need special diet, and prognosis is good so long as they retain their normal gastro-intestinal functions. A patient with a good appetite and digestion requires no special diet, but should eat the same kind of food as people in ordinary health, merely increasing the quantity or, at any rate, the nutritive value. Anemic and debilitated patients who lose progressively in weight and strength need a good deal more food and of a still greater nutritive value. In fact, much depends upon the state of the individual's digestive processes; when these are in good working order, he stands a fair chance of improvement and recovery. When the digestive function is defective, his chances are greatly hindered and his diet must be supervised with corresponding care.

Great stress must always be laid upon variety in diet. Nothing is more abhorrent to the tuberculous patient, and consequently more prejudicial to the outcome, than monotony of diet. The same dishes day after day engender a distaste, even a repugnance, for such food. If the appetite is not stimulated, real progress will not be made, and to ensure this result, the dietary must possess variety. Therefore, foods are sometimes indicated which without possessing great inherent nutritive properties have the virtue of stimulating the appetite. An average standard dietary contains some 150 grams of protein and 3,200 calories daily.

DIET OF THE WELL-TO-DO CLASS.—With regard to the *diet of the well-to-do class*, examinations by Bardswell and Chapman show that in Great Britain their average intake is about 120 grams of proteins. In this country this is about the same, perhaps somewhat larger; in meat and fish, 60 per cent; in dairy produce, such as milk and eggs, 16 per cent; the average intake of the American in easy circumstances of dairy produce is considerably larger, and less of meat and fish, the remaining 24 per cent being taken as vegetable protein, for instance, in bread, potatoes, etc. Energy-producing foods are mostly taken in the form of bread, coarse bread or bread in which there is bran, especially cakes, pastry, etc., butter, puddings of various sorts, which contain milk, suet, eggs and butter, bacon and to a less extent in fruit, vegetables, jams, marmalade, sugar, etc. Approximately speaking, the proportion of fat to carbohydrate in the

ordinary diet of the well-to-do class is three parts of fat to five parts of carbohydrate. The fact must not be forgotten that fat is a more expensive although a more palatable food than carbohydrate, and hence the predilection of the well-to-do classes for fat as a source of energy is explained.

In prescribing dietaries for well-to-do tuberculous patients, the increase of 30 per cent of protein and other foods should be brought about by adding to an average normal dietary the requisite amount of foodstuffs of a similar nature to the articles of habitual consumption. If, for example, it is discovered that a person's ordinary dietary when in normal health suffices to support the system in a satisfactory manner, the addition of one and a half liters of milk daily will be enough to bring the dietary up to the adequate nutritive standard for the treatment of tuberculosis. Milk contains all the constituents of a nourishing diet adapted to the treatment of tuberculosis in satisfactory amounts, and one and a half liters of milk represent an addition of about 1,070 calories to the dietary.

However, there are several points to be considered when ordering the addition of that much milk daily. In the first place, the patient does not call in the services of a physician until the symptoms of the disease have become well marked and neither his appetite nor consumption of food is normal. This must be taken into account when prescribing a dietary. Many people do not tolerate milk particularly well, and even when they do, the addition of that much of milk to the fluids, some of which already contain milk, will somewhat severely tax the digestive and assimilative organs. In cases in which gastric and intestinal troubles coincide with the symptoms of tuberculosis, the addition of much fluid to the dietary will tend to aggravate the disorders of the alimentary tract and, in particular, to produce distention of the stomach and flatulency. An apparent idiosyncrasy is often of nervous origin, and may be overcome by disguising the taste of the milk. Flavoring the milk with bovril, or some other good fluid meat extract, in the proportion of a teaspoonful of the bovril to half a pint of milk, results in a richly flavored and nutritive beef tea, from which the taste of milk is absent. Moreover, a certain amount of milk can be given in the shape of junket, custard, egg flip and so on. For persons who do not like milk in its natural form, it is as well, perhaps, to replace it by some other food.

Puddings should always be made of highly nutritive foodstuffs. Fruit should be given at least three times a week in the form of stewed fruit, tarts, etc. Vegetables also are important in the dietary of the tuberculous; potatoes and greens may be given in fair amounts at each meat meal; also beans and peas, and to a less extent, carrots and parsnips.

Eggs may be served in a great variety of ways, beaten up with a teaspoonful of brandy, or mixed with coffee; lightly boiled, poached, scrambled or in omelettes. Milk, cream and butter are of the greatest importance on account of their high caloric value, as supplying a large amount of nourishment in a form easy to take. Milk, at any rate, is usually easily digested.

As a matter of fact, in all patients who have lost and are losing flesh, milk is almost an indispensable article of diet, although it is true that it does not suit some people, and that in certain stomachic and intestinal conditions its use is contra-indicated. Mackenzie has drawn attention to the fact that in a pint of milk there are 22.5 grams of fat, so that a pint and a half of milk and an ounce of butter will together supply about 60 grams of fat, which is more than the minimum amount necessary. The amount of milk which should be given will depend upon the state of nutrition, and upon the amount of other kinds of food taken. About a pint and a half a day, in Mackenzie's opinion, may be regarded as the average. The addition of citrate of soda (15 grams to half a pint) aids the digestibility and improves the flavor. Some will take milk more readily if flavored with a little cognac, one or two teaspoonfuls to a tumblerful. *Café au lait* is an excellent combination of food and stimulant. Milk is often taken as a beverage at luncheon and dinner, but this is not a good plan, for milk should be looked upon rather as a food than as a drink.

Before leaving the question of milk, it may not be amiss to refer to some remarks by that well-known American authority on tuberculosis, Dr. Herbert Maxon King(10), who points out that in acute cases with high temperatures and rapidly destructive lesions, a heavy protein diet is quite as much out of place as in typhoid fever, yet nourishment must be supplied if we expect to change the type of the process. It is in such cases that an almost exclusive milk diet best serves the purpose; raw, cooked or variously modified, milk is the food with the widest range of usefulness in these cases. Three liters of whole milk divided into unequal portions, the largest to be given at ordinary meal times, can be taken by most patients without inconvenience every twenty-four hours, representing 99 grams of proteins, 120 grams of fat and 150 grams of carbohydrates, or 2,137 calories. This is, of course, insufficient for the body needs in such cases, and will not prevent weight loss, but it will check it, and will give the organs concerned in digestion, assimilation and elimination the least strain at a time when it is most urgent to save the patient all unnecessary expenditure of energy. As the type of the disease changes, this milk diet must be supplemented and gradually superseded. King lays stress on the

point that in advanced cavity cases, with much underweight and without appetite, but without obviously acute symptoms, the ordinary three or four meals a day will not suffice. It has therefore been the custom in the infirmary of the Loomis Sanatorium to substitute a two-hour meal for the regular meals in such cases. The following is a fair representation of such a dietary and answers the purpose very well. It is subject, of course, to more or less daily modification to meet the whims and tastes of different patients or of the same patient on different days.

LOOMIS SANATORIUM—TWO-HOUR DIETARY

Foods	Grams	Albumin	Fat	Carbo- hydrates	Calories
6 A.M. Milk.....	190	6.27	7.60	9.50	136.23
8 A.M. Cocoa.....	120	25.92	36.91	45.24	614.52
Toast.....	28	3.22	0.44	17.12	87.74
Cereal.....	80	2.24	0.40	9.20	50.32
10 A.M. Eggnog.....	215	11.76	11.44	8.00	188.38
12 M. Soup.....	120	3.48	0.00	0.60	55.56
Scraped beef.....	37	8.36	103.00	0.00	43.91
Bread.....	42	4.07	0.38	20.58	106.13
Butter.....	27	0.28	23.80	0.00	222.82
2 P.M. Cocoa.....	120	25.92	36.91	45.24	416.52
Crackers.....	6	0.21	0.17	1.43	8.41
4 P.M. Beef juice.....	96	4.70	0.57	0.00	24.62
Milk.....	190	6.27	7.60	9.50	136.23
6 P.M. Rice.....	30	0.84	0.03	7.32	34.74
Custard.....	40	1.93	2.90	12.00	84.08
Egg.....	45	6.48	7.04	0.00	73.66
Toast.....	28	3.22	0.44	17.12	87.74
8 P.M. Milk.....	190	6.27	7.60	9.50	136.23
10 P.M. Milk.....	190	6.27	7.60	9.50	136.23
Total.....	1,794	127.71	254.83	221.85	2,644.07

DIET IN ACUTE CASES.—In far advanced, acute and complicated cases, acute exacerbations may arise in the course of an otherwise favorable case from an “overdose” of exercise or of tuberculin. In such cases there is no indication for any special change in the ordinary dietary. Of course, the patient should be placed on “absolute rest,” and while the fever continues, he will naturally partake less sparingly of food. Although patients will do better if there is no change from the accustomed food routine, on the other hand, in cases where the disease is progressive with continued hyperpyrexia, or in the presence of certain complications, the institution of more or less radical changes, both in character and frequency of the dietary, is often imperative in order to maintain sufficient alimen-

tation. It has been found good practice, by King, to give small quantities of food at regular and frequent intervals for such a period as conditions will determine. In such cases, good results will be secured by dividing the total amount of food to be given, in eight feedings at two-hour intervals through the day, the larger portions coming at the regular meal hours. The following "two-hour" feedings have been found serviceable in this type of cases at the Loomis Sanatorium. King(11) avers that this dietary affords sufficient variety, and the total quantity given in such small portions does not excite repugnance, even where there is marked anorexia.

REGULAR TWO-HOUR DIETARY AT LOOMIS SANATORIUM

<i>First Day</i>		<i>Second Day</i>	
6.00 A.M.			
Milk.....6	oz., 170 gms.	Milk.....6	oz., 170 gms.
1 Raw egg		1 Raw egg	
8 A.M.			
Orange.....3	oz., 90 "	Grapes.....3	oz., 90 "
Oatmeal.....3	oz., 90 "	Cream of wheat.....3	oz., 90 "
Cream—sugar		Cream—sugar	
2 soft cooked eggs		Butter..... $\frac{1}{2}$ oz., 14	"
		Bread..... $\frac{1}{2}$ oz., 14	"
10.00 A.M.			
Broth.....4	oz., 120 "	Cocoa.....3	oz., 90 "
Toast..... $\frac{1}{2}$ oz., 14	"	Toast..... $\frac{1}{2}$ oz., 14	"
Beef juice.....3	oz., 90 "	Beef juice.....3	oz., 90 "
12.00 M.			
Soup.....4	oz., 120 "	Cream soup.....4	oz., 120 "
Chicken..... $1\frac{1}{2}$ oz., 42	"	Lamb chop..... $1\frac{1}{2}$ oz., 42	"
Potato.....2	oz., 60 "	Potato.....2	oz., 60 "
Ice cream.....3	oz., 90 "	Bread—butter	
2.00 P.M.			
Hot chocolate.....4	oz., 120 "	Beef juice.....3	oz., 90 "
Bread-butter sand- wich.....1	oz., 28 "	1 Raw egg	
4.00 P.M.			
Milk.....6	oz., 170 "	Milk.....6	oz., 170 "
Beef juice.....3	oz., 90 "	1 Raw egg	
6.00 P.M.			
Broth.....4	oz., 120 "	Beef broth.....4	oz., 120 "
Stewed fruit.....2	oz., 60 "	Lettuce salad.....1	oz., 28 "
Scraped beef sand- wich—Beef.....1	oz. } 42 "	Toast..... $\frac{1}{2}$ oz., 14	"
Bread..... $\frac{1}{2}$ oz.			
8.00 P.M. } Milk.....6	oz., 170 "	Milk.....6	oz., 170 "
10.00 P.M. }			

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REGULAR TWO-HOUR DIETARY AT LOOMIS SANATORIUM—*Continued*

<i>Third Day</i>			<i>Fourth Day</i>		
6.00 A.M.					
Milk.....	6 oz.,	170 gms.	Milk.....	6 oz.,	170 gms.
1 Raw egg			1 Raw egg		
8.00 A.M.					
Fruit.....	3 oz.,	90 "	Fruit.....	3 oz.,	90 "
Bacon.....	1 oz.,	28 "	Cocoa.....	4 oz.,	120 "
Potato.....	1 oz.,	28 "	Toast.....	½ oz.,	14 "
Toast.....	1 oz.,	28 "	1 Raw egg		
Coffee					
10.00 A.M.					
Shredded wheat....	1 oz.,	35 "	Lettuce sandwich		
Cream.....	1½ oz.,	42 "	Milk.....	6 oz.,	170 "
Sugar			Beef juice.....	3 oz.,	90 "
1 Raw egg			1 Raw egg		
12.00 M.					
Chicken broth....	4 oz.,	120 "	Thick soup.....	4 oz.,	120 "
Rice.....	1 oz.,	28 "	Chicken.....	1 oz.,	28 "
Beef sandwich			Potato.....	1 oz.,	28 "
			Celery.....	1 oz.,	28 "
			Ice cream.....	3 oz.,	90 "
2.00 P.M.					
Egg orangeade			Rice pudding.....	2 oz.,	60 "
(Albumin—1 orange)			Bread—butter		
Beef juice.....	3 oz.,	90 "			
4.00 P.M.					
Milk.....	6 oz.,	170 "	Milk.....	6 oz.,	170 "
1 Raw egg			1 Raw egg		
6.00 P.M.					
Steak.....	2½ oz.,	75 "	Scraped beef sandwich		
Potato.....	1 oz.,	28 "	Fruit salad.....	2½ oz.,	75 "
Baked apple.....	3 oz.,	90 "	Beef juice...	3 oz.,	90 "
Bread—butter					
8.00 P.M.)					
10.00 P.M.)	Milk.....	6 oz., 170 "	Milk.....	6 oz.,	170 "

REGULAR TWO-HOUR DIETARY AT LOOMIS SANATORIUM—*Continued*

<i>Fifth Day</i>			<i>Sixth Day</i>		
6.00 A.M.					
	Milk.....6	oz., 170 gms.	Milk.....6	oz., 170 gms.	
	1 Raw egg		1 Raw egg		
8.00 A.M.					
	Cream of wheat....3	oz., 90 "	Fish.....2	oz., 60 "	
	Cream—sugar		Toast		
	Toast		Beef juice		
	Coffee		Coffee		
10.00 A.M.					
	Egg lemonade		Cocoa		
	Beef juice		1 Raw egg		
12.00 M.					
	Soup.....4	oz., 120 "	Steak.....2½ oz.,	75 "	
	Scraped beef sand- wich		Potato		
	Celery or onion....1	oz., 28 "	Custard.....3	oz., 90 "	
			Milk		
2.00 P.M.					
	Broth.....4	oz., 120 "	Gruel.....3	oz., 90 "	
	Bread—butter				
4.00 P.M.					
	Milk		Milk		
	1 Raw egg		Beef juice		
6.00 P.M.					
	Cornmeal mush....3	oz., 90 "	Omelette.....3	oz., 90 "	
	Cream—sugar		Toast.....1	oz., 28 "	
	Fruit.....3	oz., 60 "	Apple sauce.....3	oz., 90 "	
	Milk				
8.00 P.M. } Milk.....6	oz., 170 "		Milk.....6	oz., 170 "	
10.00 P.M. }					
<i>Seventh Day</i>					
6.00 A.M.	Milk.....6	oz., 170 gms.			
	1 Raw egg				
8.00 A.M.	Bacon.....1	oz., 28 "			
	Toast				
	Coffee				
10.00 A.M.	Grapenuts.....2	oz., 60 "			
	Cream				
	1 Raw egg				
12.00 M.	Roast beef.....2	oz., 60 "			
	Apple-nut salad.....2	oz., 60 "			
	Bread—butter				
2.00 P.M.	Milk (4) Toast (1).....5	oz.			
	Milk				

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REGULAR TWO-HOUR DIETARY AT LOOMIS SANATORIUM—*Continued*

Seventh Day—Continued

4.00 P.M.	Beef juice		
	1 Raw egg		
6.00 P.M.	Lamb chop.....	1½ oz.,	42 gms.
	Potato		
	Junket		
	Toast		
	Beef juice		
8.00 P.M. }	Milk.....	6 oz.,	170 "
10.00 P.M. }			

This dietary furnishes a well-balanced ration supplying about 2,500 calories and if well borne, will maintain fair nutrition and may even effect a gain in weight in spite of pyrexia and progress of the disease.

Such a diet is not always well borne, however, and may be the cause of gastric and intestinal disturbance, or possibly some other discomfort. In such cases, if there is reason to suspect the diet as a disturbing factor or a strain on the digestive organs, a semi-liquid or, in extreme cases, a liquid diet, often has pleasing results. The following are examples of such diets, as suggested by King, which in his experience are quite satisfactory.

TWO-HOUR SEMI-LIQUID DIET

8.00 A.M.	Plums		
	Farina.....	4 oz.	120 gms.
	Toast.....	1 "	28 "
	Cocoa.....	4 "	120 "
	Cream.....	4 "	120 "
	Butter.....	½ "	14 "
10.00 A.M.	Beef juice.....	3 "	90 "
12.00 M.	Cream of pea soup		
	Zwieback.....	1 "	28 "
	Butter		
	Ice cream.....	3 "	90 "
	Milk.....	6 "	170 "
2.00 P.M.	1 raw egg		
4.00 P.M.	Milk.....	6 oz.	170 "
6.00 P.M.	Milk.....	6 "	170 "
	Toast.....	1 "	28 "
	Butter.....	½ "	14 "
	Junket.....	3 "	90 "
8.00 P.M.	Cocoa.....	5 "	140 "
Average:	Protein.....		120 "
	Fats.....		138 "
	Carbohydrates.....		225 "
	Calories.....		2,622

2,000 CALORIES LIQUID DIET

8.00 A.M.	Cocoa.....	1 cup (small)	
	Eggs.....	2	
	Milk.....	1 cup	
	Orange juice.....	(1)	
10.00 A.M.	Eggnog.....	{ 1 egg 1 cup milk	
12.00 M.	Soup.....	1 cup	
	Milk.....	1 cup	
	Junket.....	4 oz.	20 gms.
	Egg.....	1 "	
2.00 P.M.	Cocoa.....	1 cup (small)	
	Beef juice.....	3 oz.	90 "
4.00 P.M.	Milk.....	1 cup	
	Egg.....	1	
6.00 P.M.	Cocoa.....	1 cup (small)	
	Milk.....	1 "	
	Eggs.....	2 "	
8.00 P.M.	Hot milk.....	1 cup	
Average:	Milk.....	48 oz.	1,350 "
	Cocoa.....	13 "	370 "
	Raw eggs.....	7	350 "
	Soup.....	6 oz.	170 "
	Beef juice.....	3 "	90 "
	Junket.....	4 "	120 "
	Sugar.....	1 " in cocoa	120 "
	Orange juice.....	3 "	90 "

On page 228 is a diet list for the well-to-do compiled by Bardswell and Chapman, and although designed for British natives, it should, with some alterations, suit the tubercular well-to-do of this country.

Perhaps the majority of those in easy circumstances on this continent take a substantial meal in the middle of the day and another substantial meal after their day's work is done. In the country districts of the United States, it is the custom of the people to eat their heaviest meal in the middle of the day, while in cities, the evening meal is the most substantial repast. Whatever may be the time at which meals have been eaten, it is well to preserve the customary times, but to take care that the food eaten meets the requirements of the particular case of tuberculous disease for which it is given. The quantity of food and the kind of food must be adapted to the digestive and assimilative powers of the patient. If his or her stomach is weak, as is more or less frequently the case with those suffering from tuberculosis or with tuberculous tendencies, it is useless and harmful to cram them with unsuitable food or more food than they can properly digest.

PATIENTS' DIETARY (Bardswell)

DIET "A" MAN

Breakfast: Two breakfast cups milk (usually flavored with coffee). Four ordinary sized "triangles" toast (or bread); a piece of butter the size of a walnut; 1 egg; an ordinary sized helping of bacon, cold ham, tongue, a herring, or a fillet of fish, etc.; 4 tablespoonfuls porridge (in place of half the bread) and milk or cream.

Lunch: A tumblerful of milk.

Dinner: A tumblerful of milk; an ordinary sized helping of fish or entrée; 2½ oz. (a large helping) of meat; 2 potatoes, the size of a hen's egg; green vegetables, according to taste; half a round (thick) bread; a piece of butter the size of a walnut; a large helping (4 or 5 oz.) milk or other pudding; stewed fruit and custard or creams, etc.

Tea: Tea, a slice of thin bread and butter and a piece of cake, pastry, etc.

Supper: A tumblerful of milk; soup, if desired; an ordinary helping of fish or entrée (meat, potatoes and vegetables; pudding, etc.) as at lunch; half a round bread or toast; a piece of butter the size of a walnut; savory or cheese, etc.; dessert, if desired.

At Bed-time: A tumblerful of milk.

DIET "B" WOMAN

Two breakfast cups milk (usually flavored with coffee). Three ordinary sized "triangles" toast (or bread); a piece of butter the size of a walnut; 1 egg; an ordinary sized helping of bacon, cold ham, tongue, a herring, or a fillet of fish, etc.; 3 tablespoonfuls of porridge (in place of half the bread) and milk or cream.

A tumblerful of milk.

A tumblerful of milk; an ordinary sized helping of fish or entrée; 2 oz. (a large helping) of meat; 2 potatoes, the size of a hen's egg; green vegetables, according to taste; half a round (thick) bread; a piece of butter the size of a walnut; a large helping (3 or 4 oz.) milk or other pudding; stewed fruit and custard or creams, etc.

Tea, a slice of thin bread and butter and a piece of cake, pastry, etc.

A tumblerful of milk; soup, if desired; an ordinary helping of fish or entrée (meat, potatoes and vegetables; pudding, etc.) as at lunch; half a round bread or toast; a piece of butter the size of a walnut; savory or cheese, etc.; dessert, if desired.

A tumblerful of milk.

DIETS FOR THE WORKING CLASSES.—In every country of the world a large proportion of the tuberculous belong to those who toil with their hands even if they do not always actually earn their daily bread by the sweat of their brow. Thus far in discussing diet for those sick with consumption or who are beginning to be sick with that disease, we have proceeded on the premise that the consumptive is most likely to make satisfactory progress on the special foods which he has previously been in the

habit of eating. We shall continue to debate this question from the same perfectly sound standpoint. The man who gains his livelihood by manual labor, eats as a rule a larger bulk of food than the one who does not physically thus exert himself. In fact, he requires a greater bulk of food material. Furthermore, many of the working class in this country, and practically all of this class in Europe, eat a greater quantity of carbohydrates because food in this form is cheaper than fat. Consequently, we may roughly consider that those who live by the work of their hands, more or less literally, will consume, say, five parts of carbohydrates to one of fat. Again, the legitimate workman, that is, the workman in contradistinction to the brainworker, in a general way, cannot afford to pay so much for the means of keeping himself in good physical condition.

Conditions here are on the whole better by far for the working man than in Europe, and many working wage earners can and do buy the best the market affords with which to nourish their bodies. But perhaps it may be said without the fear of exaggeration, that the largest proportion of the working class, even in this favored land, are so situated that expensive food is beyond their reach. Especially is this the case in the large cities in which a goodly part of the immigrant population settles. New York, Boston, Philadelphia and Chicago are the chief examples of this state of affairs, and in these centers there is almost as much grinding poverty as in the large European cities. This phase of the subject will be directly considered under the head of home treatment of tuberculosis.

According to tables prepared by Bardswell and Chapman, the average British working man takes some 33 per cent of his protein in the shape of meat and fish, as compared to 60 per cent taken by the well-to-do classes in the same foodstuffs, 20 per cent in the form of dairy produce, 30 per cent in the shape of bread, and 17 per cent in other vegetable forms. Of course, the food taken by the American working man cannot be compared with any degree of exactitude with that consumed by his British confrère. In the first instance, there are here a diversity of races, the members of which at least for a generation or two and to a large extent for all time adhere to the kind of food which they were in the custom of eating in their home lands. For example, it is probable that Italians are never great meat eaters, and generally speaking, eat little or no meat. On the other hand, the Germans are large meat eaters, and probably in this country, the German working classes and those of German origin eat more meat here than they ate in the fatherland, for the reason that they can afford to buy more. Members of the other races eat with some modifications the same description of food as they had at home. The

working people of British stock eat much the same kind of food, although on a more lavish scale, as those in Great Britain itself, although adaptations of diet are made in accordance with climate.

Nevertheless, the main contention is the same, that the average working man's diet is a distinctly bulky one, owing to the large amount of carbohydrate it contains. Therefore, it may be laid down as an axiom that for many healthy members of the working classes, a diet of considerable bulk, in addition to an adequate nutritive value, is necessary to satisfy hunger.

In order to construct a diet for use by the working class, the question of cost must be considered and in this country both the cost of food and the buying capacity of the working consumer vary a good deal. Milk is a more or less essential part of a working man's diet; meat is another and pulse food is also a requisite. With regard to the very poor, Bardswell and Chapman set down a diet table cheaper by far than could be bought in most sections of this country, but which is interesting as demonstrating upon what kind of food health can be adequately maintained, and because it will also be found suitable for the treatment of tuberculosis.

It has been conclusively proven that the diet of one afflicted with tuberculosis should conform as nearly as possible to that to which that person is accustomed in health. The diet of the working classes is more bulky and contains more carbohydrates than the alimentation of the well-to-do and consequently the tuberculous subject of the laboring class should ingest these foods in similar proportions to those he is in the habit of eating when in good physical condition.

The extent to which some physicians advise super-alimentation is regrettable. If the patient is so fortunate as to possess vigorous powers of digestion and assimilation, the results for the time being appear very gratifying, as far as gain in weight is concerned; but, as a rule, sooner or later the overburdened digestive organs rebel and become seriously deranged, the gained weight, or even more, is rapidly lost, and the general health suffers proportionately. Neither does the intake of a very large diet, although it may occasion no symptoms of disturbed gastric or intestinal functions, always result in the gain in weight anticipated because only a part of the food ingested may be appropriated.

A case in point has been given by von Ruck(12) which may serve for illustration. "A young man recently under our care, before entering the institution had been advised by his physician to take as much food as possible. He was taking three large meals each day, besides five pints of

milk and twelve raw eggs, an amount of food roughly estimated as representing well over 6,000 calories. With this he gained at the rate of a pound and a half per week. It was explained to him that this amount of food was far in excess of his requirements and was liable to lead to digestive complications, and he reluctantly consented to dispense with six of the eggs. At the end of a week he had made his usual gain. The other six eggs were now discontinued; the gain remained the same. Next three glasses of milk were withdrawn, and the following week three more. The diet had now been reduced to that calculated as a suitable standard for the individual, and with this he continued to gain steadily." These authors(13) conduct a Sanatorium for the well-to-do classes and give the following table showing the results of weight gain in 965 patients while under treatment.

VON RUCK'S TABLE OF BODY-WEIGHT

CLASS	Cases	ADMISSION			DISCHARGES								
		Lost Weight	%	Average Lbs.	Lost Weight	%	Average Lbs.	Stationary	%	Average Lbs.	Gained Weight	%	Average Lbs.
I. Class A....	172	106	61.6	8	1	0.58	2	25	14.5	....	146	84.8	9.5
II. Class B....	422	338	80.0	10.5	8	1.9	4.5	33	7.8	....	381	90.3	8.4
III. Class C....	371	318	85.7	12.5	63	17.1	10.3	46	12.3	....	262	70.6	12.0
Total.....	965	762	79	10.9	72	7.4	9.5	104	10.7	....	789	81.7	9.7

In discussing the subject of weight gain they say: "We have frequently emphasized our position in regard to comparative weight records, which is, that even a marked increase of weight does not possess the significance with which it is frequently credited. A gain in weight means to us that, for the time being, the patient is free from toxemia and that there are no gastro-intestinal complications which cause material disturbances of the appetite, the digestive functions, and the general metabolic processes of the particular patient. In this sense, we are pleased to note a gradual increase of the weight records of our patients. In order to prevent overtaking of their digestive functions, we have often occasion to caution them to be satisfied with a moderate continued gain, and we discourage all attempts on their part to accumulate fat, after the loss of weight which they had experienced has once been restored.

"Our tabulation shows only the averages of the total gains. If we had esteemed it of sufficient importance, we could without a doubt have increased these averages by insisting on efforts to secure additional gains in weight in a large number of patients who had reached their normal weight or had exceeded it, instead of cautioning them, as we did, against the danger of digestive complications from overtaxing the digestion organs, and insisting upon sufficient exercise to prevent a useless accumulation of fat.

"The gain in weight experienced by individual patients, therefore, stood more directly in relation to the previous loss; it varied from a pound or two to nearly fifty pounds. In a considerable number of patients, the total gain attained was actually greater than appears from the tables, because the progressive losses did not always cease soon after admission to our care, and often continued until they amounted to five or more pounds over that ascertained on admission, before the condition of the patients became favorable for an increase."

Sanatoria Treatment of Pulmonary Tuberculosis.—In the treatment of pulmonary tuberculosis, there are three points which stand out prominently. The first is that if the best results are to be gained, the disease must be treated in its incipency. Treated properly in its earliest incipient stages, arrest and cure are practically certain in the majority of cases. This means that an early diagnosis must be made and the disease treated under comparatively favorable conditions. It is at this juncture, with special reference to tuberculous members of the working class, that good home treatment is so effective, and this branch of treatment will be referred to at some length later. The second point is that when the disease has progressed beyond the incipient stage, the patient should, whenever possible, be transferred to a sanatorium for treatment. The last point is that when tuberculosis has exhibited itself in an advanced stage, the patient should be isolated in a hospital so that he may not prove a menace to the community at large. With this last type of the disease, we have not so much to do here as with the more hopeful types. The matter of treating advanced cases from the dietetic standpoint has already been fairly well discussed.

The sanatoria for the working classes hold out hope of cure and, of course, diet enters predominantly into this part of the question. One of the objections formerly raised against sanatoria for the working classes was that while treatment therein apparently effected much good, and in many instances seemed to have cured the disease, it unfitted the patient for work and, on the resumption of his ordinary labors, he soon broke

down. In the majority of such sanatoria a system of graduated labor is in vogue at the present time; as soon as the individual is able, he is assigned a graduated amount of work such as he was in the habit of doing when in health. He therefore leaves the sanatorium fitted to once again wage the battle of life.

It goes without saying, that in sanatoria in which the patients are employed in various forms of manual labor, a diet of higher caloric value must be given than in those in which no work by hand is done. The protein value of such a diet should work out at 150 grams and the total caloric value at about 4,000. For the sake of bulk and cheapness, the extra amount of nourishment required, especially the increase of protein, may be obtained from vegetables. However, it is best to give this vegetable protein in comparatively small amounts and in palatable form. A diet of this character should be reduced 15 per cent when prescribed to women patients.

Home Treatment of Tuberculous Patients.—After all, the home treatment of tuberculous patients of the working classes and of the poor working classes in particular, is the most important and the most perplexing part of the problem. In the first instance, the difficulty is in an early diagnosis. The patient is apt to defer consulting a physician as long as possible, more especially if he suspects himself that he has tuberculosis. The disease is regarded as somewhat of a slur on an individual and on his family and besides entails a considerable amount of trouble and expense to all concerned. The discovery of the infection is therefore frequently put off until it is advanced beyond the possibility of further concealment; successful treatment is, in consequence, delayed and sometimes completely hindered. Nevertheless, on the whole, it may be said that home treatment is the most important phase of the tuberculosis problem for the self-evident reason that most patients must be treated at home. Only a small percentage of the total number of phthisical patients can be treated in institutions or in tents and bungalows built expressly for the purpose. It is therefore necessary to adapt the homes, and especially to supervise the diet, in such a way as will best meet the needs of the patient.

Poor tuberculous patients living at home and in cities are either treated as out patients of a hospital or at dispensaries. Within recent years, the dispensary treatment of tuberculosis has gained much ground and, indeed, one of the most practical agencies existing for combating tuberculosis is the dispensary, such as exists in America, Great Britain, France, or the Fürsorgestellen in Germany. The men selected to preside over such insti-

tutions are experts not only in the diagnosis and treatment of tuberculosis, but also in its prevention. The homes of patients are visited by competent nurses, who assist the physician in carrying out the most modern methods of treatment. The patient and his friends are instructed in the measures which must be taken in order to prevent the spread of infection.

DIET IN HOME TREATMENT OF PULMONARY TUBERCULOSIS.—The ordering of or rather advice as to the diet is perhaps the most important part of the duties incumbent on those concerned with the management of dispensaries for the treatment and prevention of tuberculosis. It is difficult, almost impossible, to direct the dietetic treatment of tuberculous persons belonging to the working classes, unless they are immediately under supervision, such as is in vogue in an institution. In a home of the poor, instructions with regard to diet are seldom carried out in a satisfactory manner. In our opinion, more satisfactory results in such cases will be attained by giving general directions such as the following: "You require much more food than you took before you became a consumptive. Do not hurry over your meals; you will feel satisfied frequently before you have eaten enough, and you must continue to eat even when you feel as if you did not require more food. Your appetite is no guide as to the amount you need. The best way to find out whether you are eating enough is to weigh yourself every week, always at the same time of day and in the same clothes. If you have not gained at least one pound, you will know you have not been eating enough. The following notes may be useful to point out how to spend money in food calculated to do the most good. Buy the best meat you can afford, and if you cannot buy joints, buy pieces. Tripe, sausage, bullock's liver are cheap and nutritious, but money spent on lamb and veal is to a considerable extent money wasted. Buy good butter if you can afford to do so, but if money is lacking, good margarine will answer the purpose very well. Buy as much new milk as you are able, but if your means are too limited to buy much new milk, buy as much as you can afford and make up the deficiency with separated milk which, of course, is cheaper by far."

Cheap cheese is as nutritious as expensive cheese, and it must be borne in mind that a plain cheese is highly nutritious. Eggs are an expensive food and except in the early summer months, are not well within the reach of those who have not much money to spare.

Oatmeal is a cheap and excellent food. Coarse Scotch oatmeal is the best form, but other forms, as Quaker oats and Provost oats, may be eaten with advantage. Dried peas, beans and lentils are valuable foods and

may be eaten every day, boiled as vegetables for dinner or in the form of soup for supper.

Potatoes are required every day and are best bought in comparatively large quantities at a time. Fish makes a desirable change of diet and any white fish may be eaten in season and when cheap.

CONCENTRATED DIETS.—When the patient is in such a condition that he is unable to take a fairly generous diet, as one of the standard diets, for example, his chances of progress or recovery are very much lessened. Anorexia occurs frequently in consumptive patients, and frequently necessitates very careful dieting. Early tuberculosis is often marked by anorexia and the condition is intensified when the diet is inadequate. Those suffering from early tuberculosis, especially those living in unhygienic surroundings, very frequently have this anorexia. As a rule, the digestive organs are normal.

The most effective way to treat this type of anorexia is to place the patient under good hygienic conditions and give him as much nourishing food as he can take. He should be encouraged to eat even if appetite is absent. A generous diet almost invariably is successful and one patent reason why patients suffering from anorexia do better in a sanatorium than in their homes, is that the diet can be more strictly supervised. Anorexia associated with high fever in patients suffering from acute tuberculosis is much more serious. A patient with a high temperature seldom retains a normal appetite. When high fever occurs in the majority of febrile diseases, in most instances the normal diet of health can be largely reduced without disadvantage. This, however, is not the case with tuberculosis, where the patient's diet must be kept at a high standard of nutritive value. As Bardswell and Chapman point out, the same principle holds good for another type of anorexia, commonly met with in tuberculous patients, viz., the chronic loss of appetite associated with slowly progressive disease of long duration.

On page 236 is an example of a concentrated diet which, according to King, has proven very satisfactory. It permits of sufficient variety, and will be found acceptable to most patients.

The impairment of constitution which usually accompanies long standing progressive tuberculosis is, in the opinion of these authorities, largely atonic in character, as stomach and metabolic investigations in these cases show that digestion and absorption are almost invariably normal. The dietetic treatments then of the anorexia of acute constitutional disturbance, and of digestive impairment of disease of long standing are very similar. In the presence of acute symptoms, such as high

CONCENTRATED DIETARY (King)

FIRST DAY			SECOND DAY	THIRD DAY
<i>Breakfast:</i>				
Hominy	3 oz.	90 gms.	Same, but vary style of serving eggs.	
Cream	1 "	28 "		
Eggs	2			
Cocoa	4 oz.	120 "		
Toast	1 "	28 "		
Butter	1½ "	14 "		
<i>Dinner:</i>				
Roast lamb	2 "	60 "	Broiled chicken	Roast beef
Rice	5 "	140 "	Baked potato	Rice
Milk	1 cup		Milk	Zwieback
Zwieback	½ oz.	14 "	Zwieback	Butter
Butter	½ "	14 "	Butter	Milk
<i>Supper:</i>				
Baked potato	3 "	90 "	Lamb chops—2	Squab (or chicken)
1 egg (omelette)			Rice	Baked potato
Zwieback	½ oz.	14 "	Zwieback	Zwieback
Butter	½ "	14 "	Butter	Butter
Milk			Milk	Milk
<i>Average:</i>				
Protein	110 gms.			
Fats	115 "			
Carbohydrates	260 "			
Calories	2,500			

fever and so on, it is wise to persuade the patient to take an ordinary diet, as one of the standard diets, and to remind him that his illness is likely to be protracted and that he must take a good supply of food daily in order to get better. Sometimes, the ordinary diet gives rise to dyspepsia, or the patient has the greatest difficulty in eating his meals and in either of these events, such a diet should be discontinued. The kind of diet for anorexia must be left, to a large extent, to the discretion of the attending physician.

Nevertheless, progressive anorexia and dyspepsia, and especially the onset of nausea and vomiting, positively indicate that the diet should be modified by concentrating it.

Two objects should be aimed at in constructing concentrated diets:

1. To give the necessary nutritive value in an appreciably smaller bulk than that of our ordinary diets.

2. To give the diet generally in a more easily taken form, for which purpose the amount of solid food is diminished.

METHODS OF CONCENTRATION.—When it is desired or considered necessary to feed a tuberculous subject on concentrated diet, such food as is lacking in or possessed of little nutritive value obviously should be diminished or even entirely discarded. With this object in view, the amounts of the bulky foodstuffs should be decreased and other foodstuffs of smaller bulk but of a similar nutritive value substituted. In order to keep up the protein intake to the requisite standard, it is advisable to increase the nutritive value of milk by adding to it a soluble casein preparation. Milk puddings and soups may be fortified in a similar way. According to Bardswell and Chapman, as much as an ounce and a half of a casein preparation may be taken daily without giving rise to the slightest disturbance of the alimentary tract.

Increasing the eggs in the diet is another good method of keeping up the protein intake. Patients with anorexia are generally intolerant of sweet foods, and the amount of sugar contained in the foodstuffs of such patients may with advantage be greatly decreased. Sweet puddings are apt to nauseate febrile patients, and puddings more or less unsweetened can be well taken for a much longer time. Variety is needed when diets of considerable nutritive value must be taken for a prolonged period. The following two dietaries are examples of the concentrated diets which Bardswell and Chapman are in the habit of prescribing.

CONCENTRATED DIET IN ANOREXIA.—The first (*see* p. 238) is the ordinary standard diet fortified and somewhat concentrated, and is suitable for patients with a moderate degree of anorexia. The second is a more or less fluid diet and is suitable for patients whose anorexia is associated with high fever.

Occasionally when anorexia is persistent and severe, food must be given more frequently and in smaller amounts. The following is an example of a fluid diet given frequently in small amounts at a time.

FLUID DIET

- 8 A.M. Milk, $\frac{1}{2}$ pt.
- 9 A.M. Milk with casein (coffee for flavor), $\frac{1}{2}$ pt.; $\frac{1}{2}$ pt. bread and milk.
- 11 A.M. $\frac{1}{2}$ pt. Benger's food with casein.
- 1 P.M. Milk with casein; bovril, $\frac{1}{2}$ pt.; or raw meat, milk; or raw-meat sandwiches, 2 oz.
- 3 P.M. Egg and milk or thin custard, $\frac{1}{2}$ pt.
- 5 P.M. Milk tea, $\frac{1}{2}$ pt.
- 7 P.M. $\frac{1}{4}$ tin Leube-Rosenthal meat solution; or $\frac{1}{2}$ pt. raw meat, milk; or $\frac{1}{2}$ pt. milk bovril, or $\frac{1}{2}$ pt. milk and arrowroot pancreatized.
- 10 P.M. $\frac{1}{2}$ pt. Benger's food with casein.
- 4 A.M. Milk and egg (with or without alcohol), $\frac{1}{2}$ pt.

DIET I

ANOREXIA

MEN

Breakfast: Milk, 1 pt.; small quantity tea or coffee (chiefly for flavoring milk); 1½ oz. bacon, etc.; egg; 2 oz. bread or toast; ½ oz. butter.

11 A.M. Milk and casein, ½ pt.

Lunch: Milk, ½ pt.; 2 oz. fish or entrée; 2 oz. meat, fowl or game; small amount potatoes, etc.; 2 oz. bread or toast; ½ oz. butter; milk pudding, stewed fruit and custard, junkets, creams, etc. (perhaps containing casein), ordinary helping.

4 P.M. Small quantity tea, bread and butter, etc., if desired.

Dinner: Milk, ½ pt.; 2 oz. fish; 2-3 oz. entrée, fowl, game, etc.; 2 oz. bread or toast; ½ oz. butter; ordinary helping light pudding; jellies, fruit, custard, etc. (perhaps containing casein); any simple dessert.

Bed-time: Milk and egg, ½ pt.

WOMEN

Milk, 1 pt.; small quantity tea or coffee (chiefly for flavoring milk); 1½ oz. bacon, etc.; egg; 1½ oz. bread or toast; ½ oz. butter.

Milk and casein, ½ pt.

Milk, ½ pt.; 2 oz. fish or entrée; 2 oz. meat, fowl or game; small amount potatoes, etc.; 2 oz. bread or toast; ½ oz. butter; ordinary helping milk pudding; stewed fruit and custard, junket, creams, etc. (perhaps containing casein).

Small quantity tea, bread and butter, etc., if desired.

Milk, ½ pt.; 2 oz. fish; 2-3 oz. entrée, fowl, game, etc.; 1½ oz. bread or toast; ½ oz. butter; ordinary helping light pudding; jellies, fruit, custard, etc. (perhaps containing casein); any simple dessert.

Milk and egg, ½ pt.

DIET II

ANOREXIA

FOR MEN OR WOMEN

8 A.M. (On waking) Milk, ½ pint.

Breakfast—9 A.M. Milk (with casein) made into tea or coffee, ½ pint; ½ pt. boiled bread and milk; 1 egg poached or scrambled on small piece of buttered toast.

11 A.M. ½ pt. Benger's food with casein.

1 P.M. Milk, ½ pt.; ½ oz. toast (or rusks) and butter; 2 or 3 oz. pounded chicken, etc., steamed fish or raw-meat sandwiches; ½ pt. thin custard.

4 P.M. Tea made with milk, ½ pt.

6 P.M. Milk, ½ pt.; 2 or 3 oz. fish or pounded chicken, etc.; ½ oz. toast (or rusks) and butter; 5 oz. junket, light pudding, etc.

9 P.M. ½ pt. Benger's food with casein.

During Night: Milk and egg (with or without alcohol), ½ pt.

NOTE.—1½ oz. of casein should be worked into the diet daily and 5 oz. of cream added to the day's supply of milk. The nutritive value of this dietary is: P., 175; F., 100; C.H., 200; Calories, 3,025.

General Summary of Diet in Tuberculosis

Doctors Karl and Silvio von Ruck sum up their personal experiences on the subject as follows: "We do not hesitate to assert that a diet scheme for tuberculous patients is at best only suggestive, and that individualization is necessary in this as well as in other features of their treatment. A fair number of cases come under professional care free from fever or complications and in the still closed or so-called early stage of pulmonary involvement. Such patients are often in a satisfactory state of nutrition, and a wholesome mixed diet is all that is necessary. Dieting in this class is restricted to the conservation of the digestive functions, by cautioning the patients against indulgences and against excesses in the endeavor to accumulate weight. In all other uncomplicated or complicated cases of the pulmonary disease where nutrition as expressed by body weight is below normal, the cause must be sought and determined individually. The lack of appetite or its capricious character and the consequent loss in weight are referable to a variety of causes, which the physician must determine. In the early stage, the cause is often a specific toxemia through absorption of toxins produced by tubercle bacilli, in the absence of an adequate specific immunity. A study of the digestive functions shows nothing abnormal, the lack of appetite of such patients is not a matter of caprice on their part, nor can their desire for food be restored by forcing them to eat. The indication is to remove the cause, which implies the increase of the patient's specific immunity by proper specific treatment.

"A deficiency of nutrition in the febrile period of the more advanced disease is frequently due to a similar cause, depending upon the absorption of an excessive amount of toxins of tubercle bacilli or other pathogenic organisms. Specific treatment, with a view to increase the patient's immunity against the tubercle bacillus or its toxic products, is frequently contra-indicated, because the absorption is quantitatively in excess, and the organism is incapable of supplying or increasing specific antibodies for their destruction or neutralization. In such cases diet does not meet the indication, which calls for measures tending to limit absorption of the toxic products by rest or by lung compression. In cases of so-called 'mixed infection,' autogenous or even properly selected stock vaccines are often strikingly successful.

"Although such patients need an abundance of food, the quantity must be adjusted to the capacity of the digestive functions. The nature of an existing impairment must first be ascertained and the complication be

removed or improved, before we can hope to check the loss or to increase the patient's weight. In this class of febrile cases the patient often needs encouragement to take an adequate amount of food. If the digestive organs permit, we give solid food rather than milk, broths, etc.; and by catering to personal preferences as to kinds and mode of preparation, assisted by a dainty service and proper persuasion, the patient will as a rule eat all that he can digest. An adequate amount of fluids, to be taken an hour before or several hours after meals, is essential to the elimination of toxic and other waste products. Milk—sweet, skimmed or buttermilk—can be used to advantage, especially if the food taken at meals requires supplementing.

"In our own practice, we endeavor to avoid all routine, and in cases with poor appetite and consequent loss of weight, we try to find the cause, as a rule, successfully. Aside from toxemia, we find gastro-intestinal and other complications and before exhorting such patients to eat more or attempting to reach larger caloric values in the daily total consumption, we seek to remove the complications, and endeavor to be at least reasonably certain that the food will be properly digested and assimilated.

"In the absence of toxemia or complications, the tuberculous patient, who is still in a condition to derive benefit, eats well, digests his food and assimilates it, and gains in weight, if this is below normal. We deprecate any attempt to increase a patient's weight beyond that which should be considered normal for the age in children and for the height and sex in adults. Of patients who tend to accumulate fat in excess we demand either less food consumption or more physical exercise, or both.

"In regard to the control of the caloric value of food rations we find the 'scale' is an equally valuable guide; so long as there is loss or no gain in weight in an insufficiently nourished patient, we know that the food quantity is either inadequate, or that assimilation is at fault. The insufficiency of food taken is readily ascertained, while a painstaking inquiry and examination of the digestive functions point the way to their restoration.

"We do not recommend special foods, much less those prepared artificially, or so-called predigested food preparations. While we advise our patients with a view to securing a proper balance in nitrogenous food and carbohydrates and fats, we give them the widest liberty in choosing their source and form, according to individual preferences. Many of our patients have recovered large losses in weight sustained during acute processes and complications, without recourse to more milk and eggs than they relished and on a general mixed diet, such as they were accustomed to before their disease declared itself."

TUBERCULOSIS OF VARIOUS ORGANS

Laryngeal Tuberculosis with Dysphagia.—The dietetic treatment of dysphagia has been referred to briefly when diseases of the stomach were discussed. But dysphagia is a more or less common symptom of tuberculosis of the larynx and calls for special dietetic treatment. Dysphagia as an accompaniment of this form of tuberculosis is sometimes so slight as to necessitate no alteration in the ordinary diet. Therefore, seeing that a patient with laryngeal tuberculosis requires a generous diet and that a generous diet in most cases will bring about a rapid improvement in the laryngeal condition, such a diet should be recommended unless the difficulty in swallowing is so great as to render the act painful or inconvenient. In severe dysphagia, semi-solids or fluid diets must be relied upon until that stage of improvement is reached, when ordinary diet can be resumed. On the whole, a semi-solid diet is more suitable in the treatment of dysphagia than a fluid one. The greatest advantage attaching to a semi-solid diet is that the required nutritive value can be given in this form in a very much smaller bulk than in a fluid diet. A fluid diet of high nutritive value is so bulky as to be liable to cause dyspepsia. In both diets, variations should be constantly made, and, as a rule, perhaps the best practice is to compromise between a semi-solid and a fluid diet or to alternate them.

Laryngeal tuberculosis, of all forms of the disease, demands for successful treatment the closest attention possible to dietetic detail. Every individual case must be studied closely, trying if solid foods can be taken, and if so of what nature, and building up a diet round these articles, always permitting the patient a choice and judiciously varying the diet from day to day. Foods should be given cold and iced fluids are taken more easily than at the usual temperature.

The pain in swallowing is at times extremely severe and it may then be necessary to give food in small amounts every four, or three, or even two hours during the day. The great point is to ensure that the patient takes an adequate diet. The taking of food in the Norris-Wolfenden position, that is, lying on the side, liquid food being taken through a tube from a vessel placed slightly below the level of the mouth, or in the Wolfenden position, the patient lying on his chest with the head somewhat dependent and taking the food in the same way, may prove of advantage.

The following are two diet tables given by Bardswell and Chapman, suitable for patients with dysphagia:

FLUID DIET SUITABLE FOR PATIENTS WITH DYSPHAGIA

8 A.M.	1 pint thin Benger's food.
10 A.M.	1 egg; 5 oz. milk.
11 A.M.	1 pint milk, or soluble casein preparation.
1 P.M.	1 " milk cocoa.
3 P.M.	1 " junket.
5 P.M.	1 " thin Benger's food.
7 P.M.	1 " milk bovril.
9 P.M.	1 egg; 5 oz. milk.
10 P.M.	1 pint thin Benger's food.

During Night: 1 " milk, etc.

TOTAL: Benger's food, 3 pints.

Milk, etc., 2 pints.

Milk in other forms, 3½ pints.

Eggs, two.

APPROXIMATE NUTRITIVE VALUE: Protein, 180; Fat, 210; Carbohydrate, 280; Calorie value, 3,940.

SEMI-SOLID DIET SUITABLE FOR PATIENTS WITH DYSPHAGIA

7 A.M.	Egg and milk, 1 pint.
9 A.M.	Arrowroot or cornflour milk, or typhoid bread and milk, 1 pint.
11 A.M.	Gelatin blancmange or cream (flavored).
1 P.M.	Steamed fillets of fish, or 4 eggs scrambled with 1 oz. butter.
3 P.M.	Junket and cream, 1 pint.
5 P.M.	1 pint milk and raw meat juice.
7 P.M.	1 " velvet soup.

During Night: 1 " Benger's food or milk, cocoa, etc.

APPROXIMATE NUTRITIVE VALUE: Protein, 164; Fat, 210; Carbohydrate, 220; Calories, 3,013.

Hemoptysis—DIET IN HEMOPTYSIS.—With regard to the dietetic treatment of hemoptysis, this must be largely regulated in accordance with the extent of the bleeding. If the hemoptysis is slight, no special diet is indicated. If the bleeding continues, or is somewhat profuse from the commencement of the attack, the diet should be restricted, especially in the amount of fluid taken, in order to reduce the blood pressure as much as possible. No tea or coffee is allowed and the amount of milk should be reduced to one pint a day. The solid food should also be slightly reduced in quantity. The immediate object when hemoptysis is severe should be to reduce the blood pressure promptly, and to maintain it at a low level after bleeding has completely ceased. The diet should be of little bulk and as nearly solid as is attainable. Little or no food should be given for twenty-four hours after a severe hemor-

rhage, milk in small amounts, one or two teaspoonfuls at a time being allowed. The milk should be iced and small lumps of ice to suck may be given.

For two days after twenty-four hours have elapsed without recurrence of the bleeding, the diet should be small in amount, non-stimulating, and should not contain a great deal of fluid. All food should be taken cold. On the third or fourth day after the attack, the diet is increased and the original diet can generally be resumed in ten days' time.

The following is the diet prescribed by Bardswell and Chapman for the fourth day after an attack.

- 8 A.M. 1 egg beaten up with milk, 1 oz.; 1 oz. buttered toast.
- 10 A.M. Raw-meat sandwich, bread, 1 oz.; 1 oz. meat; butter.
- 12 M. 3 oz. custard pudding.
- 2 P.M. 3 " Benger's food.
- 4 P.M. 3 " pounded chicken or fish; bread or potatoes, 1 oz.
- 6 P.M. 2 " milk and casumen; 1 oz. toast; buttered.
- 8 P.M. Poached egg on toast.
- 10 P.M. 3 oz. junket, custard.
- 2 A.M. 3 " Benger's food.
- 4 A.M. 4 " milk and casumen.

Tuberculosis of the Intestines.—Tuberculosis of the intestines is more common by far than is generally supposed. Fenwick and Dodwell found the intestines involved 500 times in 883 sections of persons who had died of tuberculosis, and Eisenhart found intestinal involvement 566 times in sections on 1,000 tuberculous subjects. Baungarten is of the opinion that practically every individual suffering from advanced tuberculosis has some involvement of the intestinal tract. Indeed, the fact must be recognized that tuberculosis of the intestinal tract is extremely frequent in individuals suffering from advanced tuberculosis, and this should be borne in mind when dealing with the intestinal symptoms of these cases. When the diagnosis of intestinal tuberculosis has been made, or when the condition is suspected, the state of the digestive tract should be well looked after. Both diarrhea and constipation must be prevented as far as is possible and in remedying these conditions, diet is an important factor.

DIET IN INTESTINAL TUBERCULOSIS.—The special indications in the treatment of tuberculosis of the intestines are: 1. To prevent irritation of the diseased area. 2. To prevent excessive peristalsis. In order to adequately accomplish this end, the diet must be composed of foodstuffs which are as fully absorbed as possible and which leave but a small amount of unirritating residue. Consequently, the total bulk of food

taken must be small and the diet of a dry character. If the attack of gastric irritability is severe, the patient should be placed on a liquid diet; milk in some form, diluted or peptonized, fulfills the purpose best. Buttermilk and kumiss are valuable in this condition and are often well borne.

With regard to intestinal tuberculosis in its ordinary form, that is when the attacks are not acute but the gastric irritability is persistent and troublesome, the following foodstuffs are of service: raw meat, either in milk or better still in sandwiches—raw meat being very readily absorbed and leaving little residue; fresh meat juice and broths may be allowed. The predigested liquid beef preparations are useful and may be given diluted with water. For the same reasons that raw meat is indicated, underdone meat is suitable. Thoroughly cooked meat should be avoided as irritating fragments are apt to be left undigested.

Although in the acute cases milk in some form is valuable, it should not be given in excessive amount, as the hard curd which is frequently formed unless the milk has been specially prepared, is liable to cause irritation. Eggs are most useful and should be used freely. Cheese when carefully dissolved and the free acid neutralized by bicarbonate of soda, is a nourishing and suitable food material in these cases. This solution can be used in the preparation of various savory dishes. Butter and cream may be given freely in place of much of the carbohydrate in the ordinary diet. Bread should be toasted, and plain biscuits may be given with advantage. Most puddings, particularly the custards, blanchmanges, creams and some milk puddings, are usually digested fairly well.

The following foodstuffs should be avoided: porridge, soups, green vegetables, and fruits, except in very small amounts. Pottenger, however, advises that when constipation is present, it should be combated by a suitable diet, preferably with fruits and fats rather than with coarse foods which contain irritating particles injurious to the diseased mucous membrane. Tea and coffee should be avoided, except for flavoring purposes. Casein preparations tend to set up diarrhea and should be used with much discretion.

When the patient is suffering from tuberculous diarrhea, he should be put immediately upon a restricted non-irritating diet, consisting at first, perhaps of milk and lime water only, two parts of the former to one of the latter. It is rarely necessary to continue a diet of milk alone for longer than twenty-four hours. After that period, milk toast, boiled rice, and the whites of eggs may be added, and later scraped meat, soft-boiled and poached eggs, tropon. The diet should not be increased so long as

the intestinal tract is intolerant. In many cases, it will be necessary to eliminate fruits, fats, coarse vegetables and all laxative foods for some time. Ordinary soups and beef tea are liable to bring on diarrhea, but do not always have that effect when thickened with flour. They may also be made the vehicle for giving meat powder or somatose. Potatoes are laxative sometimes, and when this is the case must be forbidden, their place being taken by dry toast or rusks. Friedenwald and Ruhrah are of the opinion that alcohol may be used in the later stage of the disease or when the patient is very weak. Old brandy mixed with a small quantity of a cold carbonated water or teaspoonful doses of iced champagne are advised in very serious cases. Larger doses may be given in the less severe cases.

A point to be strongly emphasized is that food and drink should be given in small quantities at short intervals, one to four ounces every two or three hours, or twice as much at longer intervals. The quantity taken should be carefully measured and recorded, as otherwise the patient may receive an insufficient diet or more than is good for him. In severe cases, washing out the stomach gives more relief than any other procedure. In less severe cases, a glass of hot water with or without sodium bicarbonate may be taken on rising, and at least half an hour before eating, or preferably an hour before a meal. If no food can be retained, forced feeding by means of a stomach tube may be tried.

The following dietary may be found useful:

DIETARY FOR INTESTINAL TUBERCULOSIS

Breakfast—8 A.M.

2 eggs scrambled; steamed fillet of fish, 2 oz.; toast, 2 oz.; butter, $\frac{1}{2}$ oz.; milk, coffee, $\frac{1}{2}$ pint.

Lunch—11 A.M.

Leube-Rosenthal meat solution.

Dinner—1 P.M.

Underdone meat (minced), 3 oz.; or raw-meat sandwiches; toast and butter, 2 oz.; butter, $\frac{1}{2}$ oz.; blancmange, milk pudding, etc.; 5 oz., with cream, $2\frac{1}{2}$ oz.; glass of milk.

Tea—4 P.M.

Milk tea, $\frac{1}{2}$ pint or Benger's food; toast, 2 oz.; butter, $\frac{1}{2}$ oz.; egg.

Supper—7.30 P.M.

Steamed fish, 2 oz.; underdone meat, 3 oz.; toast, 2 oz.; butter, $\frac{1}{2}$ oz.; sweet pudding, 5 oz.; with cream, $2\frac{1}{2}$ oz.; or cheese custard.

Bed-time—10 P.M.

Benger's food, $\frac{1}{2}$ pint, or Leube-Rosenthal meat solution.

APPROXIMATE NUTRITIVE VALUE OF ABOVE DIETARY—Protein, 163; Fat, 165; Carbohydrate, 220; Calories, 3,100.

Tuberculosis of the Kidneys or Bladder.—Tuberculosis of the kidneys or bladder should be treated dietetically in much the same way as intestinal or peritoneal tuberculosis. But it is necessary to watch the effect of proteins by frequently examining the urine for albumin and pus. So long as the diet recommended above for intestinal tuberculosis does not increase albumin and pus, it should be continued; but if it is found to do so, the patient must be restricted to milk, bread and milk, milk puddings, invalid foods and so on. Bread and butter may be allowed; also oatmeal and casein preparations.

REFERENCES

1. BRISCOE. Index of Treatment, Latham and English.
2. SMITH, ANDREW H. Twentieth Century Practice of Medicine.
3. WETHERED. Index of Treatment, Latham and English.
4. VON RUCK, KARL and SILVIO. Studies in Immunization against Tuberculosis, New York, Paul B. Hoeber, 1916.
5. FISHER, IRVING. Transactions National Association for the Study and Prevention of Tuberculosis, 1906.
6. LAWSON, DAVID. Index of Treatment, Latham and English.
7. KING, H. M. Tr. Nat. Ass. Study & Prev. Tuber., Med. Rec.
8. POTTENGER. Text-book, Pulmonary Consumption, Saunders & Co., Phila.
9. BROWN, LAWRASON and OSLER. System of Medicine.
10. KING, HERBERT MAXON. Loomis Sanatorium, Liberty, N. Y.
11. —————. Forchheimer's Therapeusis of Internal Diseases.
12. VON RUCK, KARL and SILVIO. Dietetic and Hygienic Gazette, October, 1911.
13. —————. A clinical study of nine hundred and sixty-five cases of pulmonary tuberculosis, treated at the Winyah Sanatorium, Asheville, N. C., in 1911, 1912, 1913 and 1914, Pamphlet, 1915, Asheville, N. C.

CHAPTER VI

DIET IN DISEASES OF THE BLOOD AND BLOOD-MAKING ORGANS

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General Considerations.

Diseased Conditions of the Blood: Anemia—Posthemorrhagic Anemia, Acute and Chronic Secondary Anemia, Primary Anemia, Pernicious Anemia, Idiopathic Anemia, Splenic Anemia; Leukemia; Purpura; Hemophilia.

Diseases of the Thyroid: Goiter; Exophthalmic Goiter.

GENERAL CONSIDERATIONS

The desirability of assembling within small compass, facts of proven value in the dietetic management of diseases of the blood, will readily be recognized by those who have depended perhaps too largely on our traditional therapeutic agents in combating these obscure disorders. Previous to the last decade or two medical writers contented themselves with empirical suggestions for the exhibition of the salts of inorganic iron and of arsenic. With our increasing knowledge of the natural history of many of these diseases, however, and with our clearer grasp of the chemical problems associated with the absorption of iron, the importance of a wholesome and well selected dietary becomes paramount. If we include the further hygienic factors to be considered in the management of constitutional disease, such as rest, fresh air, exercise, climate, baths and properly supervised recreation, our armamentarium is materially strengthened and the recognized tendency of these patients to follow false gods decidedly minimized. It has frequently been expressed, that if medical research had been concerned more actively the past few years in the solution of therapeutic problems through diet, our results would perhaps be more satisfactory.

The inclination of the clinician is to stress the purely medicinal side of treatment in a given case, and leave to the nurse and kitchen attendants the selection and preparation of the food. But even the most efficient nurse cannot safely direct the feeding of a patient unless she (a) has had special instruction over an adequate period in dietetics, and (b) is familiar enough with the case to undertake the conduct of that patient's nutrition. The appalling ignorance of untrained assistants in the feeding of persons suffering, for example, from diabetes, acetonemia or one of the acute infections is an everyday observation, and only accentuates the necessity for a competent dietitian in every modern hospital. Increasing numbers of well educated young women electing these and similar courses in the domestic science departments of our leading colleges reflect a healthy change of public sentiment in this matter.

Turning now to the specific field under discussion, the very importance of diseases of the blood calls for the exhibition of our undivided forces in their arrest and cure. The environment of the patient, his daily routine, the control of factors, such as fear, worry, anxiety and over-apprehension, should be the subject of most serious consideration. The maintenance of a dietary rich in food values, or the administration of ferruginous tonics eminently suited to an abstract case, will avail but little if the patient is obsessed by the fear of death, is continually concerned about his business affairs, or is solicitous for some other member of the household. While no one with the most superficial knowledge of disease would unduly stress the mental attitude of the sick, yet the coöperation the practitioner receives from a patient with buoyant disposition and cheerful frame of mind is one of the best attested facts in medicine.

Another agency commonly overlooked in the treatment of these affections, yet of immense practical importance, is the influence of sound teeth in the restoration of health. Conversely, the sinister effect of carious teeth on digestion and assimilation cannot be emphasized too strongly. Probably the most important additions to medical literature during the past year have been those concerned with the study of focal infections and, of these, invasions from diseased teeth are the most striking. The far-reaching influence of pyorrhea and the disastrous consequence to health and life resulting from metastatic processes remote from the original focus, are a matter of common knowledge. Secondary to this, but of obvious significance, are the loss of appetite and the interference with digestion through the contamination of the food by putrefactive bacteria and their products. The disability arising from such chronic

intestinal intoxication prohibits, in a measure, the successful administration of local treatment, and thus a vicious circle is inaugurated which may readily prove to be the deciding factor in any grave disease of the blood.

Indeed, William Hunter ably supports his contention that the chief etiological factor in pernicious anemia is embraced in chronic septic infection of the gastro-intestinal tract, originating in the mouth, in the stomach or in the bowel itself. In a number of cases reported by other writers, the incidence of chronic diarrhea was noted as a possible cause. Herter recommends high colonic irrigations in all cases of this disease. With reference to the theory of intestinal intoxication, Osler states: "Bunting has shown that a picture very similar to that of pernicious anemia may be produced experimentally in animals by the injection of small doses of ricin. The investigations of Schaumann and others have shown the bothriocephalus anemia to be a hemolysis caused by a lipoid substance that may be extracted from the segments of the worm. From the intestinal mucosa of persons dead of pernicious anemia, lipoid substances have been extracted with hemolytic action of remarkable potency, causing anemia of a severe and fatal type in animals."

The toilet of the mouth, therefore, becomes an important consideration in these cases. With children it has long been noted that dental caries is a fruitful source of anemia. This depletion of the blood is produced not only by the poisons ingested, but through the inability to masticate properly. The resulting harmful practice of bolting the food is a common cause of indigestion, with great flatulence, perhaps diarrhea and, usually, very foul stools.

Inasmuch as iron, either in the form of organic or inorganic medicinal preparations, or in combination with foodstuffs, forms the basis of treatment for the majority of blood diseases, the consideration of the so-called "iron question" may properly be taken up at this point. Few problems in medicine have been the storm center for such continued and, often, so acrimonious controversy as those associated with the absorption of iron in the human body. It would appear, from a perusal of the literature, that physiological chemists are finally agreed on this matter. Meyer and Gottlieb(1) give a very lucid review of the experimental studies which have led to definite conclusions concerning iron metabolism. Abderhalden(2) discusses at length the modern conception of the fate of inorganic foodstuffs in the alimentary canal. Bunge(3) in his classical lectures, outlines the methods used to determine the origin of iron in the blood. These authoritative sources, relieved somewhat of the hyper-

technical nomenclature, are freely drawn upon in the presentation of the following data.

Although iron has been used in anemic conditions for ages, its administration was not placed on a scientific basis until 1746, when Menghinis showed that this element is a constant constituent of the blood. He ventured to assert that the ingestion of food rich in iron correspondingly increased the iron in the hemoglobin. The theories of Menghinis and his co-workers were challenged for several reasons. One group of clinicians assumed that the manifest increase in the hemoglobin or in the red cells which followed the exhibition of iron, even when other therapeutic measures were omitted, was possibly more apparent than real, inasmuch as the quantitative determination of iron, hemoglobin and the corpuscular elements had been made only in a given unit of blood. The increase noted could therefore easily be a relative one, following the concentration of the blood. As a matter of fact, prolonged fasting, a condition certainly not calculated to promote vitality, is accompanied by such an increase in the red corpuscles. A further objection to the view that the formation of hemoglobin was stimulated by the administration of iron was based on the physiology and toxicology of the drug itself. Iron, in the form of organic combinations with nucleo-proteins, exists in all foodstuffs in amounts varying from a mere trace to a rather considerable quantity. Described by some as hematogens, these nucleo-albumins are doubtless absorbed by the mucous membrane of the duodenum and jejunum, and provide the organism with the iron constituents essential to health.

Aside from a few items such as milk, white bread, rice and certain fruits, the average ration contains sufficient iron for ordinary needs. With regard to the absorption of inorganic salts, the controversy has only recently been settled. In brief, it may be said that following the use of these preparations, iron may be demonstrated, both by histological examination of the intestinal mucous membrane and by the chemical analysis of the lymph from the thoracic duct.

Meyer and Gottlieb assert that this can be shown forty-five minutes after introduction into the stomach of a .06 per cent solution of ferric chlorid. Kinkel has disproven the theory long held that while these inorganic salts are actually absorbed by the upper bowel, they are promptly excreted in the lower bowel, and that their sole function might be to combine with deleterious substances in the intestine possessing a strong affinity for iron; for example, the sulphids. His work seems to establish the fact that the excess of iron is stored up in the liver and

spleen to be used in the synthesis of hemoglobin. Kimkel repeatedly bled two puppies of equal size and weight and of the same age, thus rendering them extremely anemic. He then fed both dogs on an exclusive diet of milk except that one received, in addition, a daily dose of six milligrams of iron in the form of the *Liquor ferri albuminati*. After six weeks, one dog was still very anemic, the blood containing only 0.019 per cent Fe_2O_3 , and the entire liver only 0.004 grams of Fe_2O_3 , while the other animal, receiving the iron, had progressed to recovery. Its blood contained 0.035 per cent Fe_2O_3 and the liver 0.032 grams of Fe_2O_3 . These findings were subsequently confirmed by Cloetta and by Abderhalden.

Not only may we now fairly conclude that the salts of iron are utilized in the production of hemoglobin, but we are also justified in assuming that they exert a specific action on the hemopoietic organs; *e.g.*, the bone marrow, and probably on the metabolism of other tissues. For instance, Romberg has observed that, in chlorosis, the tissues contain unusual amounts of water, which disappears under the administration of iron. Fr. Müller reports that the bone marrow of animals, rendered anemic by bleeding, contains more nucleated red cells when iron is used than is found in cases where no iron is added to the normal diet.

This specific stimulation of the elements which produce hemoglobin was noted by Trousseau, and emphasized by Harnack and von Noorden. It is interesting to note in this connection that the organic preparations of iron, now exploited so widely, do not seem to possess this latter property. Although hemoglobin derivatives, they are decomposed with difficulty and probably serve the organism much as does the organic iron present in food. In any event, they may be considered as of less value than the simple inorganic preparations.

According to Bertrand, the very opposite holds true of arsenic, which ranks with iron as a stimulant to the blood-making organs. The fact that Bertrand was able to demonstrate that arsenic is a constant constituent of living cells is significant.

With the therapeutic rôle of iron salts finally determined, it would seem a rational scientific procedure, in the management of the anemias, to select those foodstuffs rich in iron, provided always, however, there is no antagonism on the part of the digestive apparatus. To this end, the medical attendant will bend every effort toward securing for the patient such freedom from oral, gastric and intestinal irritation and intoxication as will best fit him to profit by the régime instituted. Many authorities recommend *foods rich in hemoglobin*, such as rare meat, blood and beef

juice. In this connection, the iron content of certain foods has been accurately determined by Bunge(4) and published as follows:¹

ONE HUNDRED GRAMS DRIED FOOD CONTAIN FOLLOWING
Fe. IN Mg.

Blood Serum.....	0	Beans (white).....	8.3
Egg White.....	A trace	Carrots.....	8.6
Rice.....	1.0 to 2.0	Wheat Bran.....	8.8
Barley.....	1.4 to 1.5	Strawberries.....	8.6 to 9.3
Wheat Flour.....	1.6	Cherries (red).....	10
Cow's Milk.....	2.3	Hazelnuts.....	13
Human Milk.....	2.3 to 3.1	Apples.....	13
Figs.....	3.7	Dandelion Leaves.....	14
Cabbage (inner leaves).....	4.5	Cabbage (outer leaves).....	17
Rye.....	4.9	Asparagus.....	20
Almonds (peeled).....	4.9	Yolk of Egg.....	10 to 24
Wheat.....	5.5	Spinach.....	33 to 39
Potatoes.....	6.4	Pig's Blood.....	226
Peas.....	6 to 6.6	Hematogen.....	290
Cherries (black).....	7.2	Hemoglobin.....	340

The minute quantity of iron found in milk immediately provokes the inquiry: "Why do not all babies rapidly become anemic?" Bunge explains this readily by pointing out the relatively enormous amounts of this element stored up in the liver of young animals at birth. His experiments seem to indicate that there is approximately five times as much iron in the liver of the newborn as in that of an adult. This is expended according to the needs of the body, and is sufficient until foods richer than milk in their ferruginous content can be taken and assimilated. Toward the end of the first year, therefore, the addition of spinach, asparagus, beef juice and the yolk of egg to the diet of the baby will replenish the store of iron and effectually prevent the anemia so often noted at this period.

Lorand(5), quoting Ascher, states that not only the liver but the spleen is vitally concerned in the assimilation of iron. He found that dogs, following splenectomy, eliminated more iron than healthy ones, and argues that this organ must control the retention of iron in the body. As a food, the spleen, commonly sold as "smelt" or "milt," is extremely rich in iron.

During the second year, raw meat or scraped beef may be introduced in the dietary, and if fresh vegetables are not well borne, they may be

¹ See Volume I, Chapter XI.

used with advantage in soup. König has demonstrated the great nutritive value of the egg, which in addition to an iron content amounting to 0.39 per cent of the total volume, contains phosphorus, lecithin, lime salts and traces of arsenic.

With these general considerations in mind, we may proceed to a discussion of dietetic treatment in various diseased conditions of the blood.

DISEASED CONDITIONS OF THE BLOOD

ANEMIA

In anemia, from whatever cause, our aim is to restore the lost elements of the blood as rapidly as possible. Experience has shown that special feeding in conjunction with proper medication, accomplishes this much more quickly than where iron is used alone.

Posthemorrhagic Anemia.—In posthemorrhagic anemia the blood serum can be quickly restored to its original amount by the ingestion of fluids, such as broth and hot milk. Water must be freely administered, either by the stomach or, in the form of normal salt solution, subcutaneously, intravenously, or by the bowel. The restitution of the protein elements requires a much longer period, and here the choice of a suitable dietary, together with the exhibition of non-irritating iron preparations, combine to hasten convalescence. As soon as possible, rare meat, eggs, green vegetables, and cereals should replace the liquid diet, and beef juice or albumin water be served between meals. Small quantities of solid food, served frequently, will tax the digestive apparatus less than the customary three meals of normal individuals. If these portions are preceded by *nux vomica* and followed by a moderate dose of dilute hydrochloric acid, digestion and assimilation are materially encouraged. The form of iron to be employed in these cases is largely a matter of choice among a number of excellent preparations, but certainly the inorganic salts seem most potent.

Acute and Chronic Secondary Anemia.—In acute or chronic secondary anemia where the hemolysis is due to infection, sepsis or intoxication, the aim of the clinician is to remove the cause as promptly as possible. For example, the distressing anemia accompanying such diseases as malaria or uncinariasis will persist or increase until the etiological factors have been eliminated through specific treatment. No hematinic will be of value in the profound anemia seen in infections with the fish tape worm until the parasite is expelled. In rheumatic fever, typhoid and similar infections, as well as in cases of chronic poisoning with mercury,

lead or arsenic, the blood-making organs are not easily stimulated until the disease is arrested or the toxic elements removed.

In addition to the use of iron or arsenic, and the careful supervision of the food, also such hygienic requirements are imperative in these cases as will place the patient in the best possible condition to profit by such stimulation. These measures include rest, fresh air, sunshine, massage and baths. The value of light table wines in these conditions has been emphasized by Fitch(6) and others.

Primary Anemia (Chlorosis).—Although the cause of this peculiar anemia is quite unknown, there is unquestionably a diminished formation of iron rather than an increased destruction(7). The metabolism of protein in chlorosis does not seem to be disturbed. In nearly one hundred per cent of the cases, however, there is a hyperchlorhydria. It is most frequently seen in girls between the ages of thirteen and twenty, living under unfavorable conditions or suffering from chronic constipation. Sir Andrew Clark has laid especial stress upon the latter symptom, and believes chlorosis to be simply a resulting intoxication. Whatever its origin, the pathology is chiefly concerned with the striking reduction of the hemoglobin. In ordinary cases this is usually diminished to half the normal amount, and in rare instances it may be less than twenty per cent. Another unusual feature, first pointed out by Haldane and Smith, is the great increase in the blood plasma.

Notwithstanding its unusual manifestations, chlorosis is rightly included among the few disorders for which we have an absolute specific. Iron, in this disease, is comparable to quinine in malaria. Cabot says: "In any case of supposed chlorosis which does not yield readily to iron administered in the proper manner and in the proper dose, we have reason for doubting the diagnosis." Practically all authorities recommend in this disease the very reliable Bland pill, and Osler suggests that its use be continued for at least three months. Constipation is best treated by salines given on rising, and the hyperacidity controlled with suitable alkalis.

DIET IN CHLOROSIS.—The indications from a dietetic standpoint are to supplement iron with the most nutritious foods, and to secure proper digestion and absorption through measures suggested above.

As already pointed out, the dietetic treatment of anemia is subsidiary to the administration of iron and particularly so in the *primary* or chlorotic type. It is sometimes a difficult question how radical the treatment should be. Is it necessary to confine the patient to bed and to a fluid diet, or should the patient be allowed a limited amount of exercise

and a solid dietary from the beginning? Usually it is more satisfactory to err on the side of safety in these cases, and we append below dietaries advocated by Coward(8) in this disease. (*See also* Volume III, Chapter XXVIII.)

DIETARIES IN PRIMARY ANEMIA (CHLOROSIS)

MILK DIET

- 4 A.M. Milk, 10 oz. (hot or cold).
- 8 A.M. Bread and milk, 15 oz.
- 11 A.M. Egg flip, 10 oz.
- 1 P.M. Milk pudding and milk, 15 oz. (corn flour, ground rice, semolina, sago, tapioca, arrowroot, custard).
- 3 P.M. Boiled rice, 10 oz.
- 5.30 P.M. Milk pudding or bread and milk, 10 oz.
- 8 P.M. Milk, 10 oz.

The quantity of milk may be increased to 4-6 pints in the twenty-four hours.

LIGHT DIET

- 4 A.M. Milk, 10 oz.
- 8 A.M. Milk or weak tea with milk, 10 oz.; bread and butter, 2 oz.; white fish, boiled with white sauce, 4 oz., or an egg, lightly boiled or poached.
- 11 A.M. Milk, or pudding, 10 oz.
- 1 P.M. Chicken or white soup, 10 oz.; chicken or white fish, 4 oz.; bread, 1 oz.; potatoes, 2 oz.; vegetables, 1 oz. (cauliflower, cabbage, sprouts, etc.); milk pudding, 10 oz.
- 5.30 P.M. Milk or weak tea with milk, 10 oz.; bread and butter, 2 oz.; an egg, or white fish, 4 oz.
- 8 P.M. Milk, 10 oz.

FULL DIET

- 4 A.M. Milk, 10 oz.
 - 8 A.M. Milk or weak tea with milk, 10 oz.; bread and butter, 4 oz.; white fish, 4 oz.; or an egg.
 - 11 A.M. Milk or milk pudding, 10 oz.
 - 1 P.M. Soup, 10 oz.; meat, boiled or roasted, 6 oz. (chop, steak, mince, mutton, chicken); bread, 2 oz.; potatoes, 2 oz.; milk pudding, 10 oz.
 - 5.30 P.M. Milk or weak tea with milk, 10 oz.; bread and butter, 4 oz.
 - 8 P.M. Milk, 10 oz.
- Cream, 10 oz. per diem.

FRESH FOODS

The following "fresh foods" are often useful:

Bread, unsweetened biscuits, scones; butter, jellies, marmalades; milk puddings (corn flour, arrowroot, sago, tapioca, semolina, rice); thick soups (white, potato, barley, etc.); broiled white fish (sole, whiting, haddock, cod); raw meat, chopped fine or scraped is more easily digested than cooked meat; fresh young birds (chicken, pheasant, partridge, grouse); beef, mutton, tripe, rabbit; potatoes, cabbage, Brussels sprouts, cauliflower, peas, beans, lettuce, tomatoes; grapes, strawberries, melons,

bananas (in moderation); oranges, apples, pears; milk, cream, curds and whey; eggs, custard; tea, to be infused for three minutes, and mixed with nearly an equal quantity of milk.

Salt meats, salt fish, dried meats, vinegar, pickles, bashes, fried foods, citrus fruits, tart berries, confections, nuts, tea and coffee are forbidden. No dried, salted, tinned, or preserved foods of any kind are allowed save infant foods, which may be added to the milk and bacon. The food must be roasted, boiled, stewed, or broiled. Sauces must not be highly seasoned. Condiments are to be used sparingly.

The excess of plasma in the circulation would seem to call for a dry, salt free diet. The patient should be limited to not more than a liter of fluids daily, and only enough salt used to properly season such vegetables as potatoes. The saline purgatives may, therefore, serve a double purpose, in correcting the tendency of many of these patients to become edematous. Equal parts of milk and carbonated water are apparently especially well borne.

Pernicious Anemia.—Far different problems present themselves in the management of this variety of the primary anemias. Of unknown origin and insidious onset, subject to remissions and baffling changes in the clinical picture, it ranks among the most fatal diseases of mankind. Cabot reports but six instances of apparent recovery in a series of twelve hundred cases.

That the life of the patient may be prolonged, however, and a reasonable degree of comfort secured, through careful supervision of digestion and elimination, is attested by many clinicians of wide experience. In this disease, arsenic replaces iron as a therapeutic agent. It may be administered as Fowler's solution, atoxyl, sodium cacodylate or salvarsan; orally, subcutaneously, intermuscularly or intravenously. No considerable evidence has accumulated to show that it has any great influence in arresting the progress of the hemolysis. The fact that all observers note the frequency of gastro-intestinal manifestations, such as sore mouth, gastric crises, nausea or vomiting and diarrhea, would seem to indicate that this system bears in many cases the brunt of the attack.

Moraczewski found that N, P, Cl and Ca were badly assimilated. Nothnagel observes that it is primarily a problem of assimilation, rather than feeding. In seventy-nine cases studied by Cabot, in which the gastric juice was analyzed, only one case showed any considerable quantity of hydrochloric acid.

TREATMENT IN PERNICIOUS ANEMIA.—The necessity for a careful choice of foods is therefore apparent. Bone marrow has been recom-

mended by many writers, following Barrs, who suggested using the red marrow of calves rather than of oxen. It is best served raw, with stale bread, and seasoned. The spleen and liver may also be used, being rich in nucleo-albumins containing iron.

The intestinal indigestion, commonly present in these cases, is best treated by the use of Bulgarian buttermilk, kefir, kumiss, or some similar preparation of fermented milk. Klemperer and Ebstein employ large amounts of cream and butter with the object of increasing the essential lipid cholesterolin. While there is no special evidence that diet *per se* modifies the course of the disease, the following suggestions from Smith(9) have been found of genuine value.

DIETARY IN PROGRESSIVE PERNICIOUS ANEMIA

Breakfast—7 A.M.

Fruit—apples (baked, raw or stewed), apple sauce, stewed pears, peaches, apricots, prunes, berries of all kinds in season; steak or chops, breakfast bacon, broiled honeycomb tripe, broiled chicken, calves' liver and bacon, fish (any kind in season), broiled or baked in cream; baked potato with plenty of butter, toasted bread with butter, coffee with an egg beaten up in it, milk or cocoa.

Lunch—10 A.M.

Kumiss or milk.

Dinner—1 P.M.

Soups (preferably purées), potato, celery, tomato, peas, corn; roasts: lamb, beef, chicken, quail, partridge; vegetables: Irish potato, lettuce, spinach, stewed celery, cauliflower, parsnips, beets, carrots, squash, string beans, new green peas, tomatoes, cucumbers (cut thin as tissue paper); stale bread and butter, cooked fruit, light puddings: tapioca, junket, bonny clabber, apple sago, baked custards of all kinds, blanchmange; one cup of tea or cocoa.

Tea—4 P.M.

Milk, egg or beef albumen.

Supper—6 P.M.

Soups as for dinner, clam or fish chowder, fish or eggs, if not taken for breakfast; stews: lamb, beef, chicken; baked potato, with butter, stale bread, dry toast, or pulled bread with plenty of butter: fruit, as for breakfast (preferably cooked); one cup of tea, cocoa or milk.

Late Supper—9 P.M.

One glass of milk or kumiss.

Suggestions.—Beef albumen may be given in doses of two ounces, twice daily. Eat slowly, and thoroughly masticate the food. Do not drink during the meal. Buttermilk, kefir or kumiss should be taken between meals and at bedtime, when milk is not well borne; or milk in some form. Two or three times, at different periods in the day, the white of an egg may be given in orange juice.

Idiopathic Pernicious Anemia (Addison's Disease).—This disease is marked by anemia, great languor and debility, remarkable feebleness of the heart's action, irritability of the stomach, and a peculiar change in the color of the skin. Diagnosis made on sight. In the earlier stages, abdominal symptoms are rarely experienced, though anorexia may be extreme and persistent, later both gastric and intestinal symptoms may be severe, often leading to a fatal issue. Nausea and vomiting may be severe and violent, interfering seriously with the ingestion of food.

TREATMENT IN IDIOPATHIC PERNICIOUS ANEMIA.—The treatment must be handled symptomatically and along general lines already pointed out in pernicious types of anemia. (*See also* Volume III, Chapter XIII, p. 491.)

Splenic Anemia (Banti's Disease).—"Primary splenomegaly" is a primary disease of the spleen of unknown origin, characterized by progressive enlargement of the spleen associated with anemia. In a large proportion of these cases, the enlargement of the spleen is due to a well recognized cause, such as hepatic cirrhosis or amyloid disease, but in many cases no such cause is demonstrable, and in all probability we have to deal with a specific disease of unknown origin. The disease is usually chronic in type and is not altogether incompatible with fair health for many years.

Although there is a general resemblance between splenic anemia and pernicious anemia, lack of information on the former prevents any close comparison.

TREATMENT IN SPLENIC ANEMIA.—The treatment should be carried out along lines similar to those suggested in pernicious anemia. The dietary should be bland, easily digested, and suited to the age of the patient.

LEUKEMIA

Cabot's contention that in every case of leukemia, the entire hemopoietic system is involved, is well supported by the reports of numerous observers. Like pernicious anemia, its onset is gradual and the serious import of its initial symptoms not often recognized. It is essentially fatal, acute cases dying usually within three months and the chronic invasions continuing from six months to four or five years (Osler). Gastro-intestinal derangements are not so common as in pernicious anemia; they appear later in the disease and are more easily controlled.

TREATMENT IN LEUKEMIA.—Arsenic, benzol and the x-ray are used in the treatment of leukemia, and the diet employed in chlorosis, *i.e.*, one

rich in protein, is recommended. A decided increase in the excretion of nitrogen, noted in most cases, would indicate the free use of such food-stuffs, but the condition of the digestive tract must always be considered.

A generous diet is indicated where the alimentary symptoms are slight and where the condition of the mouth will permit. If splenic enlargement is marked, it may interfere by causing discomfort after eating. Usually the meals should be composed of easily digested foods, moderate in amount and at frequent intervals. Special attention must be given to the toilet of the mouth, especially in those cases where a diffuse leucocytic infiltration involves the gums. Here the food should be fluid or semi-solid as outlined in the fluid dietary in primary anemia. Milk should be the main article of the aliment and given plain or predigested in as large quantities as can be tolerated; later, boiled rice or any of the finer farinaceous foods and meat extracts; Valentine's meat juice and raw meat juice are sometimes well borne. When gastric symptoms are severe, the food must necessarily be restricted to fluids, frequently administered in small quantities. Rectal feeding may have to be resorted to, but can rarely be carried out satisfactorily.

PURPURA

Purpura, in its various forms, may be considered a symptom rather than a distinct disease, yet writers agree that until properly classified, the condition demands special recognition. It has been defined as a spontaneous hemorrhage into the skin or the mucous membranes, in contradistinction from the secondary purpuras seen, for example, in the acute infections. It occurs most commonly in the male sex and in the second decade of life. There is a constant and remarkable reduction in the blood platelet count, and retraction of the blood clot does not usually occur. Magnus-Levy and Edsall found serious departures from normal metabolism in cases studied. Of the many types of purpura, the hemorrhagic form is the most common.

TREATMENT IN PURPURA.—The treatment of the condition involves the management of the underlying cause. It includes proper hygiene, rest, hydrotherapy, the use of calcium and iron, and good food. Pratt recommends a light and varied diet during the active stage, and the addition of meat, green vegetables and eggs during convalescence. Anti-scorbutic agents, such as lime juice, are indicated.

HEMOPHILIA

Although properly classed among the diseases of the blood, hemophilia is a congenital affection, distinctly hereditary and characterized by severe hemorrhages from the slightest injury. The nature of the disease is as yet unknown.

TREATMENT IN HEMOPHILIA.—In the treatment, salts of calcium, especially calcium lactate, have appeared to render good service. No extensive experimentation or observation has been made concerning the rôle of diet in the management of the hemorrhages or its influence between attacks, but the citrus fruits are recommended by many writers and an exclusive milk diet by others.

DISEASES OF THE THYROID

DIET IN DISEASES OF THE THYROID.—On first examination, it would seem that any serious consideration of the effect of diet in the evolution of these obscure affections must be so essentially theoretical as to render it of little value for the practitioner. Careful inquiry, however, shows that the past few years have brought out many significant facts in the intensive biochemical studies of the thyroid. It has now been fairly well determined, for example, that the functions of this gland have a notable influence on the metabolism of carbohydrates, through control of the pancreas; that the thyroid affects protein metabolism by direct action on the liver, and that calcium metabolism is regulated through its stimulation of the parathyroids.

Reid Hunt(10) has reported in detail the effects of a restricted diet and of various diets upon the resistance of animals to certain poisons. His experiments seem to indicate that certain diets have constituents useful in building up material in the thyroid, which are able to combine with iodine or which increase the iodine receptors of the thyroid. In other words, it is possible to influence through the food one of the most important hormones of the body, at least to some degree. Hunt has also shown (11) that the resistance to a poison, such as methyl cyanide, is much greater in the case of mice fed on oatmeal or on oatmeal and liver, than in those living on a diet of eggs, crackers and milk. On removal of the thyroid, however, it was found that the resistance to the poison was lowered 50 per cent in the first group, while it was not affected at all in the animals of the second series. The thyroids of the mice living on oatmeal and liver were large and vascular, bleeding freely, while those of the egg-fed mice were shrunken and anemic.

From the exhaustive study made in the U. S. Hygienic Laboratory, we quote the following summary:

The experiments show that foods such as enter largely into the daily diet of man have most pronounced effects upon the resistance of animals to certain poisons: they produce changes in metabolism which are not readily detectable by ordinary methods. The ease and rapidity with which certain changes in function are caused by diet are in striking contrast with the essentially negative results obtained by the chemical analyses of animals fed upon different diets.

The important functions of the thyroid seem inextricably associated with its iodine content, although the quantity in a single gland does not amount to ten milligrams. Dock states that the quantity of iodine ingested daily in the food of the average adult is about one-third of a milligram. It is necessary, therefore, for the intelligent management of diseases of the thyroid to have some knowledge of the iodine content in the various foodstuffs known to contain appreciable quantities of this element.

Tibbles publishes the following tables:

Iodine in Plants.—Potatoes, carrots, endive, parsley, nil; cucumber, 0.012; kidney beans, 0.013; pumpkin, 0.017; spinach, 0.021; sorrel, 0.047; melons, 0.060; tomatoes, 0.070; green peas, 0.084; lettuce, 0.096; beans, 0.140; chervil, 0.140; beetroot, 0.140; radish, 0.160; turnip, 0.240; French beans, 0.320 milligrams per kilo.

Iodine in Fish.—Gudgeon, 0.1; ray and skate, 0.2; mackerel, whiting and pike, 0.3; sardines, herring, carp and mullet, 0.6; shrimps, 0.7; periwinkle, 0.75; sole, eel and herring roe, 0.8; coal-fish, 0.9; cod, roach, bream, ling and gurnard, 1.2; oysters, 1.3; salmon, 1.4 milligrams per kilo.

In addition to a diet rich in iodine, the use of the glandular animal extract has become universal for the correction of such disorders as cretinism and myxedema. Here, too, the influence of diet on the iodine content in the thyroids of sheep, cattle and hogs is most striking. Hunter and Simpson(12) have called attention to the seasonal variation in the amount of iodine found in the thyroids of sheep. In the winter season, these animals, in the Orkney group of islands, subsist to a considerable extent on sea weeds, and the iodine content of their thyroids is enormously increased. Seidell and Fenger(13), in this country, confirmed these findings, which must certainly have some weight in the standardization of thyroid extract.

Taking up, seriatim, the most important diseases of the thyroid gland, we may consider:

GOITER¹

This is a disease of unknown causation marked by a gradual enlargement of the gland. It usually appears about puberty and is six or eight times as common in females as in males.

TREATMENT IN GOITER.—The indications are to use thyroid extract and foods rich in iodine. Inasmuch as simple goiter seems often associated with the use of water from certain wells or regions, boiling the water would seem to be a logical measure of prophylaxis.

Exophthalmic Goiter.²—In these cases the enlargement of the thyroid is accompanied by nervous disturbances of a profound character, exophthalmos, and very rapid heart action. It is probably more common than reported; appears in females in about the same proportion as simple goiter when compared with males, but later in life, and its etiology is still obscure.

TREATMENT IN EXOPHTHALMIC GOITER.—The treatment resolves itself into absolute rest, hydrotherapy, fresh air and diet, until surgical intervention can be secured. The marvelous results achieved by surgery in these cases make it obligatory on the medical attendant to recommend it in all cases.

Observations show that oatmeal, liver, meats of all kinds, fish, lobster, coffee, alcohol and tobacco stimulate the gland and should, therefore, be interdicted. A milk diet, especially the milk of thyroidectomized animals, is recommended. All disorders of digestion must receive careful attention and over-feeding be avoided. The use of the thymus gland as a food is advised by a number of writers. In conditions of hypothyroidism, such as *cretinism* and *myxedema*,³ the exactly opposite method of feeding is pursued. Thyroid extract, beginning with small amounts and cautiously increased is a specific. Foods which stimulate the thyroid, mentioned above, are to be indefinitely continued.

REFERENCES

1. MEYER AND GOTTLIEB. Pharmacology, Clinical and Experimental, 1914.
2. ABDERHALDEN. Lehrbuch der Physiologische Chemie, vol. ii.
3. BUNGE. Physiologic and Pathologic Chemistry, 2nd ed., 1902.
4. ———. *Ibid.*

¹ See Section on Goiter in Volume III, Chapter XIII.

² See Section on Exophthalmic Goiter in Volume III, Chapter XVI.

³ See Section on Cretinism and Myxedema in Volume III, Chapter XIV.

5. LORAND. Health and Longevity Through Rational Diet, 1916.
6. FITCH, W. E. Pediatrics, Feb., 1912.
7. TIBBLES, WILLIAM. Food in Health and Disease.
8. COWARD, JOHN, M.D. In Sutherland's System of Dietetics.
9. SMITH. Hygienic Laboratory, Bul. 69.
10. HUNT, REID. J. Am. Med. Assn., 1911, vol. lvii, p. 1032.
11. ————. *Ibid.*
12. HUNTER AND SIMPSON. J. Biol. Chem., 1915, vol. xx.
13. SEIDELL AND FENGER. Hygienic Laboratory, Bull. 89.

CHAPTER VII

DIET IN DISEASES OF THE CIRCULATORY SYSTEM

GEORGE FRANK BUTLER, A. M., M. D.

General Considerations.

Heart Disease: Organic Heart Disease; Compensated Heart Disease;
Uncompensated Heart Disease; Organic Heart Disease in Children;
Functional Heart Disease; Aneurysm; Arteriosclerosis; Angina
Pectoris; Senile Heart.
High and Low Blood Pressure.

GENERAL CONSIDERATIONS

Next to the metabolic diseases themselves, there is probably no class of disorders in which the diet plays so important a part in the treatment as those of the circulatory system; nor is there any group of diseases in which the individual requirements and idiosyncrasies of the patient call for such varied and careful differentiation. What is one man's meat is another man's poison. To be sure, a few general principles can be laid down for the regulating of the dietary in all these cases, but the carrying out of these principles entails a nice discrimination, and often demands precisely opposite courses of action.

In the formulation of a proper diet for a patient with a circulatory disorder, two aspects of the case require consideration, namely—the general condition of the patient and the particular requirements of the particular stage of the disease and its mechanics. It will immediately be seen that these two phases of the case are susceptible of a very wide variation in the detailed dietary régime, and their successful management from the dietary standpoint involves a very thorough understanding of the principles of metabolism and a no less thorough knowledge of the individual needs of the patient.

HEART DISEASE

Organic Heart Disease.—The dietetics of organic heart disease is naturally divided into the management of the case (*a*) while compensation is still maintained, and (*b*) after compensation is broken. We shall deal with the subject under these two headings.

Compensated Heart Disease.—Most of the text books on the subject teach that so long as compensation is well maintained, no very vigorous dietary is necessary. We do not agree with this teaching. In our opinion, whatever benefits are to be gained by dietetics in heart disease, are to be attained by a careful regulation of the diet during this favorable period. To wait until compensation is broken to institute dietary measures, is like locking the stable-door after the horse is stolen. While the body is still able to exercise its compensatory function and adjust itself to the altered demands laid upon metabolic economy, is the time, if ever, to assist it by an intelligent regulation of its intake. A broken compensation is, of itself, an indication that the body as a whole, is no longer able to cope with the burden imposed upon it by the diseased heart, and at such a time, little, if anything, can be done in the way of diet. The case then becomes preëminently an emergency case, and emergency cases are hardly to be reached by dietetic measures. To use a military figure, the dietary treatment of heart disease is in the nature of a flanking or turning movement, and can be successfully carried out only while the enemy is in a more or less quiescent state. As soon as the foe opens an aggressive attack, the chance for a turning movement is past, and a frontal resistance is imperative, for which other weapons and other methods must be employed.

Contrary to the general teaching, therefore, we cannot too strongly urge that a thorough and careful dietary régime be instituted in these cases of organic heart lesion during the period of compensation—indeed from the very earliest moment that the case comes under observation. It should, in fact, be the first and paramount consideration in every such case, *of far greater moment than any form of drug therapy*. The safety and comfort of the patient absolutely depend upon the intelligence with which the dietary is prescribed and the faithfulness with which it is carried out. If it is intelligently formulated and faithfully followed, the prospects are very strong that the unpleasant accident of broken compensation never will supervene.

No iron-clad rules can be laid down for the detailed feeding of these patients. All that can be done, is to enunciate a few broad principles

for the guidance of the dietitian and to indicate, in a rough way, the various ways in which these principles may call for different application in different individuals.

NECESSARY CONSIDERATIONS IN THE DIETARY OF HEART DISEASE PATIENTS.—There are, then, three prime objects to be met in the dietary of the heart-disease patient:

1. To maintain the strength
2. To avoid irritation of the heart
3. To assist the circulatory mechanism

1. It might be supposed that the maintenance of the patient's strength is simply a matter of feeding him with a sufficient and not too heavy supply of generous, nourishing food, and so, indeed, it might be, if it were not for the consideration of the other two principles at stake, or if we were dealing with an otherwise normal person. But we are confronted with the problem of nourishing to the highest possible point of efficiency an individual whose metabolism is already disturbed, and of accomplishing this with the least possible irritation to the heart muscle, and with the greatest possible consideration for the over-worked circulatory mechanism. This problem is frequently very complex and difficult of solution.

2. To begin with, the patient with heart disease is practically always more or less a dyspeptic, and his food must be selected with a view to ease and thoroughness of digestion. Ordinarily, the meals of the heart-diseased patient may be of the same size, and taken at the same intervals, as those of the well, except that the heavy meal of the day should always be taken at noon, and the evening meal should be the lightest. When the digestion is seriously impaired, it is better to divide the day's intake into five or six smaller meals. The most important point, in either case, is that the intervals are regular ones, with no "piecing" between meals, so that the digestive organs may acquire a regular habit, know exactly what is required of them, and have ample time to perform their duties.

3. Foods which produce much fermentation and gas should be avoided, for two reasons. First, because they mechanically force the diaphragm upward, and thus embarrass the movements of the already embarrassed heart; and second, because they give rise to intestinal fermentation and sepsis, thus bringing about auto-intoxication, and in this way, indirectly throwing additional work upon the kidneys, and poisoning the heart muscle. It is not always possible in a given case to say just what foods have this effect, but each patient knows for himself, or may

very quickly find out, just which articles of diet produce flatulency and fermentation in him, and these articles should be cut out of his diet. There are some foods which are generally known to produce these results in every case, such as hot breads, beans, cabbage, etc., and these should be interdicted as a matter of routine. For the same reasons, it is essential that the meals of the heart patient should be well-cooked.

DIET IN HEART DISEASE.—As to the foodstuff content and proportions of the heart-patient's diet, there really is not much difference of requirement from that of the ordinary individual. The food must contain the necessary amount of proteins and carbohydrates to furnish the needed upkeep of the tissues and the requisite supply of calories. What this necessary amount may be, must be ascertained in each individual case, and the important thing in feeding the heart patient, is that it must be as nearly as possible maintained at the precise limit, neither above nor below; for while the healthy individual can sustain health and strength for a considerable number of days on an insufficient diet, or, on the other hand, can take care of excessive quantities without any serious embarrassment, the patient with an organic heart lesion can do neither. He needs every ounce of motive power that his daily expenditure calls for, and, on the other hand, he has no margin of accommodative effort for taking care of waste products in his body.

It is generally considered that one hundred grams of protein per day is about enough for the average heart patient, but this must, of course, be regarded sheerly as a working average, to be varied with the weight, exercise, etc., of the individual patient. Certainly it should not be allowed to fall below the necessary limit, for protein increases the nutrient content of the blood, so that the nutrition of the heart muscle (which is enlarging for compensatory purposes) is improved. It is important, however, to use some discretion in the choice of the particular kind of albumin and its preparation. Raw, smoked and cured meats, as well as all internal organs, such as liver, kidneys, sweetbreads, etc., should be forbidden, or at least greatly restricted, because they contain a large percentage of purin bodies which irritate the heart and increase the blood pressure. Other meat preparations (especially boiled meats), vegetable albumins (where they are not mixed with fermentive principles), and milk, are good forms of albumin. Concerning milk, we shall have something further to say presently.

The question of the carbohydrates has already been considered. Enough must be given to furnish the proper supply of calories, and these must be of a character suited to the individual patient's digestion and

gastric peculiarities. In the use of these carbohydrates we have the greatest opportunity for ministering to the patient's tastes, and counteracting the tedium of his dietary régime. Some attention should, therefore, be paid to this part of his diet, so as to afford him as great a variety as consistent with safety. Bread, potatoes, pastry, sweets and starches should be reduced to the minimum, while the less harmful vegetables and cereals should be permitted to the greatest amount of freedom which judgment warrants. In the rare cases where the patient's digestive capacity will permit, fats are very excellent forms of administering calorie food, since they have a very high calorie coefficient, and at the same time, there is no danger of the patient over-loading his stomach with them. Unfortunately, patients who suffer from heart disease usually are victims also of hepatic insufficiency, or they are of the bilious type, so that this substitution of fats for carbohydrates, while theoretically sound, is practically unfeasible. Nevertheless, even such individuals can usually be coaxed to take more fat than they are in the habit of doing, if it be given in easily assimilable forms, the best of which are butter, cream, olive-oil, fried bacon, mayonnaise and predigested foods.

QUESTION OF FLUIDS.—A great deal has been written and spoken concerning the intake of fluids by patients with organic heart disease, and various authorities have advocated both extremes. One school, of whom Oertel is the representative, urges the restriction of fluids to the minimum, on the assumption that there is a plethora of blood, which can only be corrected by reducing the intake of liquid. Others have gone to the other extreme and advocated allowing these patients all the water they want. We think that the wise plan lies between the two extremes.

It is certain that all the water which enters the stomach must pass several times through the heart and the arteries before it leaves the body, and it is self-evident that this labor can be reduced, and the heart be spared, by giving less liquid. For this reason, a reasonable restriction of drink undoubtedly constitutes a very valuable dietetic measure. The proper course to pursue is to ascertain, from time to time, the state of the water balance, by measuring the output against the intake, and if it be found that the patient is retaining much water, he should be instructed to reduce his liquid intake accordingly. Very often, this restriction imposes considerable hardship, but if the importance of the measure is explained, most people will learn to put up with it. In all cases, fluids are best taken between meals. Eating should be accompanied by just as little drinking as is absolutely indispensable.

THE MILK DIET.—This brings us to a consideration of the vaunted

milk diet. There is no question but that the ingestion of milk is a most convenient and assimilable way of introducing the various foodstuffs into the body, especially the proteins, and its well recognized advantages have led many authorities and practitioners to the advocacy and the practice of an exclusive milk diet for heart patients, particularly for those in whom the heart lesion is associated with a chronic nephritis. Personally, we find ourselves unable to endorse the exclusive milk diet for three important reasons. First, while it furnishes the proteins, carbohydrates and fats in excellent form and in rational proportions, it is deficient in some other important food elements needed by the adult, notably in iron. Second, in order to obtain, by means of a milk diet, a sufficient quantity of albumin and calories, it is necessary to feed the average adult something like four liters of milk per day, and this quantity of milk involves entirely too much liquid intake for a patient suffering from heart disease. Third, the psychologic effect of an exclusive milk diet is bad, since the patient soon tires of the monotony and loses his appetite. Any one of these three reasons is sufficient to make an exclusive milk diet undesirable, and, in our opinion, all three together constitute a fatal objection.

This does not mean, however, that milk is not a valuable dietetic agent in these cases, or that it should be ignored. On the contrary, it is a very excellent plan to constitute milk the principal form of liquid intake, that is to say, to permit the patient to drink milk as a beverage as often as his taste will permit. In this way, he receives a certain amount of foodstuffs in the form of drink, almost without knowing it, and this enables us to cut down his solid foods. Under this system a patient can usually take about a liter of milk in twenty-four hours without any ill effect.

DIET AND WEIGHT.—The maintenance of the patient's metabolic balance includes that of his proper body weight. If he is too lean, he should be fattened up, and if he is too fat, he should be reduced. Of these two extremes, excessive fat is by far the more dangerous, and calls for more vigorous attention. One has only to bear in mind, that every additional cubic inch of fat entails that many more inches of blood vessel, and imposes that much more work on the over-burdened heart, to realize the disadvantage of over-weight. And one only has to explain this to the patient to enlist his coöperation in the reducing process.

The reduction should on no account be attempted by means of exercise. On the contrary, it should be a rigid rule that so long as the over-weight exists, the patient should take practically no exercise, but should even observe rest in bed. Reduction must be sought entirely through the

diet and the elimination. The method is substantially the same as in any case of obesity, namely, by the reduction of the *quantity* of food ingested rather than by any change in its quality and by a vigorous elimination through the various channels of the body. Oertel very wisely distinguishes two forms of obesity, one in which the heart itself is not affected, and the other in which the muscle of the heart is invaded and weakened. In the former type, it is perhaps admissible to allow the patient some reducing exercise, but in the latter, this must be forbidden. All authorities agree in reducing largely the carbohydrate rather than the protein, and Oertel insists that the fats should be very rigidly restricted. The following is a fair example of a proper régime for reducing the weight:¹

REDUCING DIETARY FOR HEART PATIENTS

Breakfast:

One cup of coffee or tea, with a little milk—altogether about 6 oz.; bread, about 3 oz.

Dinner:

3 to 4 oz. of soup; 7 to 8 oz. of roast or boiled beef, veal, game, or not too fat poultry; salad or a light vegetable; a little fish (cooked without fat); if desired, 1 oz. of bread or farinaceous pudding (never more than 3 oz.); 3 to 6 oz. of fruit, fresh preferred, for dessert. It is desirable at this meal to avoid taking fluids, but in hot weather or in the absence of fruit, 6 to 8 oz. of light wine may be taken.

Afternoon:

The same amount of coffee or tea as for breakfast, with most 6 oz. of water; an ounce of bread as an exceptional indulgence.

Supper:

One or two soft-boiled eggs; an ounce of bread; perhaps a small slice of cheese; salad and fruit; 6 to 8 oz. of wine with 4 to 5 oz. of water.

In general the following rules should be followed out in such cases:

Meat should not be taken more than twice a day and not more than six ounces at one time. Bread should be toasted in thin slices and completely browned, not merely on the surface. Soup should be avoided except a few spoonfuls of clear soup at dinner. Milk should be avoided unless skimmed. Fresh vegetables and fruits may be permitted.

It should be borne in mind that the actual quantity of food taken must have a due relation to the physical development of the individual, and what means reduction for one person would be starvation for another.

All articles of diet which irritate the heart are to be strictly avoided. This includes all condiments and spices, coffee, strong tea, alcohol and

¹ For additional dietaries see Volume III, Chapter XXVIII.

tobacco. In this as in every other respect one must use ordinary judgment and consider the habits of the patient. Those accustomed to taking alcohol may still be permitted to do so, but the quantity should be reduced as low as possible. The same rule applies to the use of tobacco.

The removal of waste products is to be encouraged by the diet as much as possible. Bowel action should be stimulated by liquids between meals, by fats and by coarse carbohydrates. Still more important is the promotion of the kidney function, and this is one of the reasons why the fluid intake must not be unduly restricted. The addition of lime water or other mineral water to the milk will not only make it more acceptable to the taste, but render it more diuretic.

If the patient develops edema or swelling of the limbs, he should be ordered to rest in bed and temporarily put upon a skim milk diet until the edema disappears.

Uncompensated Heart Disease—DIET IN UNCOMPENSATED HEART DISEASE.—When the compensation breaks, the diet must be immediately and considerably lightened. For a day or two, it is even advisable in some cases to order an exclusive skim milk diet, which rests the stomach and favors diuresis. It is not wise to continue this exclusive milk diet a long time, for the reason that a proper nutritive and liquid balance cannot be maintained by it. It is especially important in broken compensation to avoid an excess of fluid, which will overtax the heart, promote edema and hinder the re-establishment of compensation. On the other hand, too little fluid also has its dangers, as it will lower arterial pressure and retard elimination. The amount of water permitted must be estimated with exceeding care.

Concentrated or predigested foods are often best suited to these patients. Milk, whipped eggs, pounded beef or other meat, chicken or white fish may be given in small quantity. A little alcohol in some form is often needed in broken compensation. Whiskey, well diluted with water, two or three tablespoonsful daily, is, on the whole, the most suitable. Some cooked fruit pulp, stewed prunes, figs or vegetable purée made without gravy, will best combat the tendency to constipation.

As soon as compensation begins to be restored, the diet may be gradually increased, but this should be done with extreme caution, especially with respect to the increase of fluids.

Organic Heart Disease in Children—DIET IN ORGANIC HEART DISEASE IN CHILDREN.—The dietary of the child with organic heart lesions is essentially the same as that of adults. The principal differences are those which arise, first, from the fact that the child is normally a growing

organism, and second, from the irresponsible habits of the youngster. In estimating the dietetic needs of the child, we must allow for the necessary increase in his weight, and not for a mere maintenance of balance. Seldom, indeed, is it necessary to practice any reduction in the case of children. Much more frequently these patients are underweight and poorly nourished, and the problem is to nourish them sufficiently without throwing too much work upon the heart. Fortunately, the child's elimination is usually good, so that we can give him considerably more fluid than to the adult without water-logging him. Milk is, therefore, a much more available and ideal article of diet for the child than for the adult.

Even so, however, we cannot give the child enough milk to supply the needed proteins and calories without overloading him with fluid. Neither can we, in many cases, give enough solid food for the purpose without overloading the stomach; and the feeding of these little heart patients who are underweight is a considerable problem. Perhaps the best way to deal with it is to supplement the milk and the other articles of food with some form of concentrated predigested food. It is our own practice to mix one of these predigested foods with the patient's milk.

Children with valvular diseases must be carefully watched in their eating habits. They must be prevented from gorging, as children are prone to do, and made to eat slowly. The childish habit of stuffing candy must be guarded against, no eating permitted between meals, and all articles of diet must be of extreme simplicity.

Functional Heart Disease—DIET IN FUNCTIONAL HEART DISEASE.—No rules can be laid down for the dietetic treatment of functional heart disease for the simple reason that functional disorders of the heart are always manifestations of systemic troubles (usually of the nervous system) or else the indirect results of contiguous disturbances, principally of the gastro-intestinal tract.

The dietary in functional heart disorders is therefore the dietary of the particular condition which causes the disorder. In a general way, all foods are to be avoided which disturb the gastro-intestinal tract, *e.g.*, those which produce flatulence and fermentation and all those which exert an unduly exciting effect upon the nervous system, *e.g.*, stimulants and irritants.

Practically all people who have functional heart disturbances will be found, upon investigation, to have some dietary vice or some pet habit which stands in the way of recovery, and as soon as these are corrected, the heart quickly regains its composure and its tone. For example, many male patients undergo the most thorough and rigorous treatment, both

medical and dietetic, without seeming to gain much headway, until they are finally persuaded to stop smoking, and then their improvement is rapid and complete. The same thing is often true of people who persist in drinking coffee. One of the important factors, if not the prime factor, in the dietetic treatment of these cases is to find out the dietetic idiosyncrasies of the patient by searching inquiry and experimentation, and carefully to adjust his dietary routine in accordance.

For the rest, as we have already said, the dietary of functional heart trouble is the dietary of the underlying condition. The diet of patients found to be suffering from anemia, or neurasthenia, or dyspepsia, or autotoxemia, or what not, is considered in other sections of this book.

Aneurysm—DIET IN ANEURYSM.—In former times, a very severe and rigorous dieting was common practice in the treatment of internal aneurysm, with the idea that it would quiet the circulation and slow the action of the heart, thereby lessening the danger of rupture. Present-day knowledge and experience have shown that this kind of treatment much more frequently produces nervous excitement of the circulation, with a quickened and weakened heart beat, and that the anemia and depressed nutrition following extreme abstention and enforced repose often lead to exaggerated distention of the aneurysmal sac.

On the other hand, there is no question but that a proper regulation of the diet does have a most favorable influence, not only in preventing the accidents incidental to aneurysm, but in actually reducing the distention of the sac. The same principles apply to the dietary of aneurysm as to that of compensated heart disease. If there be any special point for consideration, it is that the diet must be absolutely non-stimulating. Even tea and coffee should be prohibited for these patients, and cocoa, milk and water substituted as drinks. Alcohol is not permitted under any circumstances, and in the case of men, smoking is to be strictly forbidden. Meats may be given in moderation. Otherwise the dietetic rules are the same as in heart disease.

It is of the greatest importance that the aneurysmic patient should be maintained at his normal weight. If he is fat, his weight should be reduced; if lean, it should be increased. The limitation of fluids is also extremely important, to guard against unduly raising the blood pressure.

Arteriosclerosis—DIET IN ARTERIOSCLEROSIS.—The trophotherapy of arteriosclerosis is practically the joint dietetic management of the condition of the kidneys, which in nine hundred and ninety-nine cases out of a thousand lies at the root of the arterial hardening, and of the cardiac condition which, in the same proportion of cases, supervenes upon it. The

dietetic management of heart disease, both functional and organic, has already been discussed. That of the kidney lesion is practically the same, with this modification, that as meats are the chief source of the toxins which impair the kidneys, they should be restricted to a rigid minimum in arteriosclerosis, the protein element of the diet to be furnished, as far as possible, through some other agent. Such meat as is permitted must be that which is freest from purin bodies, and whose albumin content is chiefly the sulphur proteins. In practice, it is pretty safe to instruct the patient that purin bodies are present in meat in just about the proportion that the meat has a rich savory taste, and that sulphur proteins are present to about the extent that meat is tasteless; which means that the patient should avoid the one class of meat and restrict himself to the other. This is not a very pleasant choice, but it is the safe one. Boiled meats are always better than roast or fried (and less tasty) because the boiling process extracts the purin bodies, but leaves the sulphur proteins.

MILK DIET.—Unquestionably the best agent for introducing proteins in arteriosclerosis is milk, and as long as the sclerotic patient has no organic heart lesion, there is no objection to his making milk the chief article of his diet. It cannot, however, in our judgment, be made his exclusive diet for reasons already explained under organic heart disease. It is a very good plan to give these patients periods of exclusive milk diet, watching their blood pressure and their water retention very carefully while so doing, and gradually returning them to a mixed diet, diminishing proportionally the quantity of milk. But the patient should still drink milk freely, and it should form the chief constituent of his evening meal.

The digestion of the milk is often aided by adding to it one-third part of Vichy water or some aromatic liquor like Kirsch. It is best in these cases to avoid wine and spirits as much as possible, but the addition of a little brandy or whiskey occasionally will render the milk more acceptable (as in an eggnog) and will relieve the languor and weakness which are often experienced on a milk diet.

Sea foods of all kind should be absolutely fresh. Eggs, especially raw eggs, should be eaten sparingly. Radishes, asparagus, garlic, onions and celery should be forbidden, as they contain irritating oils. Other vegetables may be eaten, with the preference given to those that grow below the ground, on account of their nutritive value. Salads are very pleasant and useful eatables for these patients, because they are laxative, and because considerable fat can be taken in a palatable form. Flour, rice and cereals may be freely permitted.

As to beverages, alcohol should be practically tabooed. Theoretically,

tea and coffee should be also forbidden, but practically this can hardly be done, because it makes the patient's life miserable. They may therefore be permitted in moderation and in weak form, thoroughly diluted with milk. Citric drinks, such as lemonade and orangeade, are extremely useful beverages, as they become carbonates in the body.

In nephritis, the elimination of sodium chlorid (common salt) is usually reduced and it accumulates as an irritant in the kidney. It is therefore a good plan to restrict the intake of salt so as to allow the kidneys to eliminate the accumulation. Especially is this true when any edema appears.

There is no disorder of the circulatory system in which diet is of greater importance than in arteriosclerosis, but at the same time individuals suffering from this disease constitute a most unruly class of patients to manage from a dietetic standpoint. With them, the pleasures of the table are a most important element in the enjoyment of life, and food habits incurred from pleasurable indulgences at the banquet board are not easily abandoned. These indulgences, moreover, include certain foods which have long acted as poisons, constituting habits analogous to the drink habit. There are those who cannot or will not see that certain foods are deleterious to their welfare.

The dietary problem that confronts us in the care of cardio-vascular disease may be summed up in a few words: the regulation of the amount of *protein food ingested*. Although protein is harmful in excess, it is very necessary in moderation. We have already discussed protein standards and shown by competent authorities that a healthy individual does not require more than 100 grams of protein daily, and that even on 50 grams he can get along fairly well. Protein is the food element for replacing the wear and tear, building up the tissues and strengthening the muscular system, and stimulating the activity of the brain and spinal cord. "It is the food element that aids in the development of great leaders and brain workers, when used wisely, but at the same time it is a food, in this day and generation, that is terminating prematurely some of the best and brightest minds of the nation."

Bishop(1), in discussing diet in arteriosclerosis, says the quantity of food should be reduced to what is necessary for the maintenance of the bodily weight and strength. He advocates five small meals daily, the largest in the middle of the day, the food to be taken as dry as possible. In outlining a dietary for arteriosclerosis and kidney degeneration, much can be accomplished by simply reducing the quantity of food as a whole, without paying much attention to its quality. Carbohydrates are neces-

sary as they furnish the principal supply of carbon which is being given off constantly by the lungs in the form of carbon dioxid. If the carbohydrates are not supplied in sufficient quantity, exhaustion soon ensues.

The question of fluids is an important one. Bishop has witnessed a marked improvement in the circulation by simply reducing the quantity of fluids ingested. A normal healthy person soon eliminates an excess of fluids taken into the system, but the same is not true in disease, and the overloading of the system with an excess of water puts an extra burden on the heart, which may be disastrous where there is broken compensation.

The danger of protein in excess has already been referred to. We again caution its use in moderation, pointing out that the end products of protein digestion are largely responsible for intestinal toxemia which is of itself a serious problem in arteriosclerosis. Kidneys with impaired function also have difficulty in getting rid of protein substances.

Bishop agrees that it is not always an easy matter to calculate the sufficiency of protein in the dietary. It is not always easy to decide whether aggravation of a condition is due to protein starvation or to the disease. However, he says, if the person is suffering from serious hardening of the arteries and kidney degeneration, with heart trouble, and is ingesting 50 grams of protein a day, the chances are that the deterioration is due to the disease, and not to protein starvation.

Below is a dietary which Bishop uses in advanced arteriosclerosis; it furnishes an illustration of the quantitative protein feeding:

DIETARY IN ARTERIOSCLEROSIS

MONDAY:		Calories	Protein
<i>Breakfast:</i>	1 orange.....	40	..
	1 small bowl of wheat berries.....	160	4
	2 slices of toast.....	115	4
	1 cup of weak coffee.....	...	..
<i>Luncheon:</i>	1 cup of bouillon.....	40	10
	2 slices of mushroom on toast.....	50	2
	1 tablespoon of potatoes.....	100	2
	1 plate of endive and lettuce salad.....	125 (oil)	..
	1 saucer of rhubarb.....	...	..
	1 piece of gingerbread.....	230	4
<i>Dinner:</i>	1 plate of vegetable soup.....	50	3
	3 tablespoons of stewed tomatoes.....	...	..
	1 large tablespoon potatoes.....	110	2
	2 large tablespoons of beans.....	60	4
	2 tablespoons of Indian pudding.....	175	8
	Lactose with each meal.....	300	..
TOTAL FOR DAY.....		1555	43

DIETARY IN ARTERIOSCLEROSIS—*Continued*

TUESDAY:		Calories	Protein
<i>Breakfast:</i>	As before.....	315	8
<i>Luncheon:</i>	4 large fried scallops.....	60	8
	2 tablespoons of chopped potatoes.....	220	4
	1 plate of cabbage and lettuce salad.....	125 (oil)	..
	2 tablespoons of preserved peaches.....	40	..
	1 cup of weak tea.....	...	..
<i>Dinner:</i>	1 plate of vegetable soup.....	50	3
	3 small slices of bread.....	230	8
	2 tablespoons of potatoes.....	220	4
	2 " " spinach.....	...	..
	1 plate of scallop and lettuce salad.....	140	4
	1 small piece of pumpkin pie.....	250	4
	1 small piece of cheese.....	120	8
	Lactose with each meal.....	300	..
TOTAL FOR DAY.....		2070	51
WEDNESDAY:			
<i>Breakfast:</i>	As before.....	315	8
<i>Luncheon:</i>	1 plate of vermicelli soup.....	120	4
	4 small potatoes.....	200	4
	2 tablespoons of gravy.....	...	..
	3 stewed onions.....	100	4
	Ice cream.....	320	8
	3 small slices of bread.....	230	8
	Cake.....	230	4
<i>Dinner:</i>	1 cup of bouillon.....	40	10
	1 tablespoon of fried potatoes.....	110	2
	3 slices of bread.....	238	8
	1 plate of lettuce and celery salad.....	125 (oil)	..
	1 cup of weak tea.....	...	..
	Ice cream.....	320	8
	Sponge cake.....	230	4
	Lactose with each meal.....	300	..
TOTAL FOR DAY.....		2878	72

DIETARY IN ARTERIOSCLEROSIS—*Continued*

THURSDAY:		Calories	Protein
<i>Breakfast:</i>	As before.....	315	8
<i>Luncheon:</i>	3 tablespoons of macaroni.....	100	3
	2 " " spinach.....	230	8
	3 small slices of bread.....	125 (oil)	..
	1 plate of lettuce and endive salad.....	250	4
	1 piece of pumpkin pie.....	120	8
	2 pieces of cheese.....	...	..
	1 cup of weak tea.....	50	2
<i>Dinner:</i>	Large plate of farina soup.....	100	3
	3 tablespoons of macaroni.....	220	4
	2 " " potatoes.....	40	..
	3 pieces of preserved peaches.....	230	8
	3 slices of bread.....	300	..
	Lactose with each meal.....	2080	48
TOTAL FOR DAY.....			
FRIDAY:			
<i>Breakfast:</i>	As before.....	315	8
<i>Luncheon:</i>	1 plate of lettuce and endive salad.....	125 (oil)	..
	2 tablespoons of potatoes.....	220	4
	2 " " fried hominy.....	120	4
	3 pieces of preserved peaches.....	40	..
	1 cup of weak tea.....	...	..
<i>Dinner:</i>	Large plate of vegetable soup.....	50	3
	2 tablespoons of boiled potatoes.....	180	4
	2 " " stewed peas.....	100	7
	2 " " rice pudding.....	175	4
	Lactose with each meal.....	300	..
TOTAL FOR DAY.....		1625	34

NOTE.—One glass Sauterne with each luncheon. Average for five days: protein, 49; calories, 2040.

Angina Pectoris—DIET IN ANGINA PECTORIS.—This condition is practically always the result of arteriosclerosis, being in fact a special localized form of arteriosclerosis. Its dietary treatment, therefore, is substantially the same as that of the underlying disease. It is sufficient to point out that in this exceedingly grave and severe form of sclerosis, the diet is of extreme importance. Special care must be exerted not to take into the stomach anything which will produce irritation, or flatulency, or

fermentation, as any one of these processes is likely to incite an attack of cardiac spasm which may prove fatal. Literally, the angina pectoris patient's life is at the mercy of his stomach.

By the same token, it is highly important for the patient to determine, or for the physician to determine for him, just what his particular gastric idiosyncrasies are, and then to govern himself accordingly, ministering to those that are favorable and guarding against those that are injurious.

In the successful dietetic treatment of attacks of angina, errors in diet must be corrected, and dyspepsia and flatulent distension of the bowels receive careful attention, guarding against recurrences. All irritating food such as peppers and spices must be avoided. Strong alcoholic drinks should likewise be tabooed, except for their efficacy in the treatment of the immediate attack. In some instances, the patients are weak and feeble and their powers of digestion much impaired; and with such patients it may be necessary to peptonize the milk allowed. As the patient recovers strength, it is important to give flesh, fish and fowl, thoroughly minced and well cooked, rather than starchy foods. With patients who are able to take more or less ordinary food, the principles to be followed are these: These patients need good nourishment, which should be of small bulk, that will promote vigorous action of the heart. The food should be most digestible, readily assimilated, and, above all, the least liable to cause flatulence. A dietary composed of flesh, fish and fowl most closely answers the above requirements. But it must not be overlooked that starchy foods should be limited in amount, because of their slow digestibility and their tendency to produce flatulence. The following articles are allowable:

Milk, good strong soups (not spiced), meat, bird, fish (all carefully selected and well cooked). Eggs are permissible, as well as well-cooked green vegetables (preferably rubbed through a wire sieve), the pulp of cooked fruit with cream, custards, junket and plain jellies. Tea and coffee are best avoided, and in any case, excess in their use must be controlled and strictly prohibited. Stimulants can only be allowed in a weak form and very small quantities. For drink, water or any of its disguises, such as barley water, toast water, home-made lemonade, and so forth, with milk, are much the best, and in many cases fairly copious drinks of hot water are directly beneficial, by aiding digestion and elimination and preventing stasis, fermentation and flatulent distention.

Senile Heart.—DIET IN SENILE HEART.—No one has ever greatly improved upon the principles and methods laid down by Dr. Balfour for the dietetic treatment of what is known as senile heart, that is, a dilata-

tion of the heart from weakness of the myocardium; and it is to him that we owe our present-day views and practice in dealing with this condition.

Balfour formulates four dietetic rules for patients of this kind, and they agree with our own experience.

(a) There must never be less than five hours between meals. (b) No solid food is ever to be taken between meals. (c) The principal meal must be taken in the middle of the day. (d) The meals should be as dry as possible.

The first three of these rules aim at allowing the digestive organs plenty of time to perform their function, and at preventing the arrest of the incompleated process, which provokes flatulence and acidity, and thus sparing the heart the direct and indirect effects of indigestion. It is, however, often a good plan to take some hot fluid three or four hours after a meal, as this will often arouse a flagging digestion, and wash the remains of a meal out of the stomach.

The following dietary prepared by Dr. Balfour is an excellent one in cases of senile heart in which there are no complications or signs of dropsy:

DIETARY IN SENILE HEART WITHOUT DROPSY

Breakfast:

Dry toast, about $1\frac{1}{2}$ ounces with butter; one egg, or half a small haddock, or an equivalent quantity of other fresh fish; tea or coffee, 3 or 5 ounces, with cream or sugar; infusion of cocoa-nibs, or milk and hot water; or cream and seltzer-water—may be, if desired, substituted for the tea. If oatmeal porridge be taken, NOTHING ELSE MUST BE TAKEN WITH IT, and not more than 3 or 4 ounces of oatmeal and 4 or 5 ounces of cream.

Dinner—1.30 to 2 P.M.

Two courses only: fish and meat, or fish and pudding, or meat and pudding; no soups, pastry, pickles, or cheese; half a haddock or its equivalent in any other white fish, boiled in milk, steamed or boiled—never fried; wing and part of the breast of a chicken, or its equivalent in sweetbread, tripe, game, or mutton, one potato, or a little spinach. The pudding should be a simple milk pudding, or about one-half pound of such fruit as pears, apples, grapes, etc., instead, either cooked or uncooked; 4 or 5 ounces of water may, if wished, be sipped during this meal.

Tea—5 to 6 P.M.

Three to four ounces of tea; no particle of solid food with it, but cream and sugar, if wished, hot water, 4 to 5 ounces, may be taken instead of it, with, if needed, a teaspoonful of Liebig's Extract.

Supper—7 P.M.

White fish and a potato, or toast with butter or some milk pudding, or Revallenta made with milk or with Liebig's Extract.

Bed-time:

4 or 5 ounces of water.

Whenever there is the slightest evidence of what Balfour very aptly terms "Soakage of the Tissues" in the dependent parts of the body, it is of the greatest importance to place the patient, for a time at least, on the driest possible diet, and not too much of it. The relief obtained by this strict diet is both remarkable and immediate.

The following is the dry diet formulated by Balfour, to which we give our hearty endorsement:

DIETARY IN SENILE HEART WITH DROPSY

Breakfast:

A slice of dry toast, about $1\frac{1}{2}$ oz.; no butter; one cup of tea with cream and sugar; not more than 4 oz.

Dinner:

The lean of two chops, not more, or its equivalent in chicken or fish; no vegetables; dry toast "à volonté"; brandy or whiskey, $\frac{1}{2}$ oz. in 3 oz. of water.

Supper:

Dry toast "à volonté"; brandy or whiskey, $\frac{1}{2}$ oz. in 3 oz. of water.

If thirsty, the patient may be permitted to sip slowly three or four ounces of hot water about an hour before each meal.

High and Low Blood Pressure.

High blood pressure is a very constant symptom of arteriosclerosis, and when such is the case, the diet recommended in arteriosclerosis is to be given. These conditions—arteriosclerosis and high arterial tension—are not necessarily associated. An individual may have general arteriosclerosis without any increase in the blood pressure, indeed there may be even a low pressure, while on the other hand, there may be a high arterial tension with no evidence whatever of thickening of the arteries due to increased connective tissue. In these cases, the cause of the high pressure may be gout, nephritis, worry, excessive mental or nervous strain, or a matter of internal secretions, etc. The diet indicated, therefore, will depend entirely upon the cause producing the high arterial tension.

The mechanism which regulates the blood pressure is very sensitive and quickly responds to any demand for a high or low pressure. It does not necessarily follow that a special treatment or diet is to be given in every case of high or low blood pressure.

The general condition of the patient—the heart, kidneys, nervous system, gastro-intestinal apparatus—the entire man, must be taken into consideration when prescribing a diet for either high or low blood pressure.

If, for example, the patient has interstitial nephritis, a diet suitable to this condition is indicated; if suffering from gout, a diet for gout; if from diabetes, a diabetic diet, etc. Each diet must be carefully planned to suit the individual case. Not only the diet, but the habits and general hygiene of the patient must be carefully regulated.

Probably the majority of patients suffering from high blood pressure would be benefited by a practically low protein diet, and by restricting the quantity of food and fluid taken at each meal.

Primary low blood pressure does not demand any special diet other than what would be required to overcome the debility or relaxing effect of some general disease, where there is no history of previous high blood pressure. A "convalescent diet," so to speak, is all that is indicated.

Ordinarily low blood pressure is not a circulatory disease as such, requiring a special diet as in diabetes, for example, but a circulatory expression of a general condition, and the diet must be determined by the character of the general condition.

Secondary low blood pressure, so called, occurs most frequently in arteriosclerosis; it consists of a fall of pressure below the compensatory point in those who have lived for a long time with high blood pressure. In these cases, the diet employed for the previously existing condition, with such restrictions or modifications as may be necessary to meet any changed or weakened state of any organ, should be given, together with rest, and such hygienic measures as will tend to restore the patient to the condition existing before the fall of pressure.

REFERENCE

1. BISHOP, LOUIS FANGERES. *Arteriosclerosis, a Consideration of the Prolongation of Life and Efficiency after Forty*, 1915, Oxford University Press, New York and London.

CHAPTER VIII

DIET IN DISEASES OF THE NERVOUS SYSTEM

GRAEME M. HAMMOND, M.D., LL.B.

General Considerations.

Diseases of the Nervous System: Apoplexy; Chorea; Epilepsy; Hemiplegia; Herpes Zoster; Hysteria; Insomnia and Disturbed Sleep; Migraine and Sick Headache; Myelitis; Neuralgia; Neurasthenia; Neuritis; Vertigo; Vagotonia.

GENERAL CONSIDERATIONS

It is now generally conceded that most degenerative diseases of the nervous system are probably of toxic origin. Beyond question, diphtheritic paralysis is due to such a condition. Tabes dorsalis and general paralysis of the insane are now regarded as latent manifestations of syphilitic intoxication. It would seem, therefore, that Sir William Gowers, the late noted English neurologist, was not far wrong when he said "that tabes and general paralysis have a relation to the microbe of syphilis analogous to that which alcoholic peripheral neuritis has to the yeast plant, only that the poison—alcohol—which gives rise to the peripheral neuritis is formed outside the body, whereas the presumed toxin which causes degeneration of the nervous system associated with tabes (locomotor ataxia) and general paralysis of the insane, is formed inside the body." There is also reason to suspect that some toxic condition of the blood is responsible for the disease known as "subacute combined sclerosis," so often associated with profound anemia and accompanied by the very interesting and not infrequently symmetrical changes in the spinal cord. Such conditions as the above have an important bearing on the dietetic treatment of these diseases only in so far as they may indicate that good and easily assimilated food in liberal quantities must be ordered to maintain a healthy equilibrium of the nervous structures to fortify them against the ravages of poisonous toxins.

The usual principles followed in the treatment of any acute disease are equally applicable in the management of any acute disease of the nervous system; for it must be remembered that inflammatory diseases of the nervous system, to a large extent, are not diseases of the nervous tissue primarily, but instead a condition in which disease in other structures leads to the impairment of function of parts of the nervous system.

DISEASES OF THE NERVOUS SYSTEM

Apoplexy—DIET IN APOPLEXY.—Apoplexy, resulting from cerebral hemorrhage, may be accompanied by a condition of permanently high blood pressure due to either arterial sclerosis or to organic disease in some one or more of the organs of digestion or elimination. In these cases the diet is of the utmost importance. Such a variety of food or such quantities of food are sometimes eaten, that toxins are readily produced, thus increasing the vascular disease on the one hand, or causing greater damage to the diseased organs on the other. In either case the effect will be to increase the blood pressure, thus exposing the individual to further attacks. A diet, therefore, is preferable which can be so readily digested and assimilated that the formation of toxins is minimized as much as possible.

Meat should be entirely excluded from the diet, at least at first. The patient is performing little or no mental or physical work and requires but a small amount of nitrogenous food. Later, when he begins to resume his habits of life, a trial of meat may be made. The blood pressure, however, should be carefully noted from day to day, and should it show a tendency to rise, the meat should be immediately excluded from the dietary.

Fruits and vegetables in general, except such nitrogenous vegetables as peas and beans, may be allowed, and fish—with the exception of halibut, sword-fish and salmon, all of which are nitrogenous—may be eaten. Milk and artificially soured milk may be freely indulged in; nor is there any objection, on general principles, to the very moderate use of coffee and tea, one cup of either, once a day. An egg, cooked as desired, once a day, is not contra-indicated. A moderate amount of toasted bread, either white or bran, may be eaten. Hot fresh bread and griddle cakes of any kind should be forbidden. Ice cream, plain cakes and puddings and plain candy may be allowed, but rich desserts, pies of all kinds and fancy ices should be prohibited.

Careful inquiry should be made into the dietary idiosyncrasies of the

individual, and articles of food which are known to habitually disagree with him should be interdicted. Observe the blood pressure frequently, and if it does not fall—and certainly if it shows a tendency to rise—revise the dietary. It is very important to insist that a large quantity of any kind of food should not be given at any one time; moderation is the keynote.

In this disease the digestive powers are always impaired, and eating more food than can be digested is invariably followed by the formation of intestinal putrefactive products toxic in character. Alcohol in any form should not be permitted. It impairs digestion and by its presence in the blood increases arteriosclerosis and diseased conditions of the organs of elimination.

While tobacco is not an article of diet, yet it is claimed that smoking impairs the digestion, and that it is one of the causes of arteriosclerosis. There is no doubt but that there are some people to whom tobacco in any form is an active poison, and that tobacco used to excess by anyone may be productive of great harm to the economy in many ways. But it does not seem probable that moderate smoking, in one accustomed to it, exerts any deleterious effect, especially in this disease.

A good deal has been advanced of late in regard to the use of food rich in vitamins, such as vegetables and fruits. Here again the individual idiosyncrasies to food must be considered. There need be no hesitation in giving any kind of food, provided it is given in moderate quantity; does not cause indigestion, and does not increase the blood pressure.

The general digestion will be greatly benefited by the prompt removal of waste products by laxatives.

Apoplexy from cerebral embolus and thrombus does not require great attention to the diet, unless these conditions are accompanied by arteriosclerosis. Moderation in eating and frequent laxation will, as a rule, meet all the requirements of the cases.

Chorea.—Besides the organic diseases of the nervous system, there are certain morbid conditions in which the nervous symptoms mainly point to disturbances in the functions of certain organs due to disease or a diseased condition of uncertain character. The most prominent of these, as well as the most important, is chorea. This disease is frequently so severe in its effects as to make the feeding of the patient a matter of both extreme difficulty and importance. Frequently, cardiac disease is a complication, especially endocarditis or pericarditis in an active stage. Otherwise, the dietary is that for chorea: An abundance of nutritious, easily digested food, rest and seclusion are the essentials for the successful treatment of this disease.

DIET IN CHOREA.—On account of the close connection between chorea and rheumatism, the diet is of great importance. Possibly it is going too far to say that chorea is always a part of the rheumatic diathesis, but in a large proportion of cases, rheumatism undoubtedly is an etiological factor. If a rheumatic basis can be made out, the diet should, of course, be strictly anti-rheumatic. Nitrogenous food should not be permitted at all. It is perhaps better to keep the patient almost exclusively on a milk diet, to which may be added an egg once a day and a few slices of toasted bread or zwieback. Spinach, lettuce, onions and an occasional potato may be allowed. In slight cases—those who are allowed to go out and exercise in the fresh air—the diet may be a little more liberal. To the things already enumerated, a piece of chicken, a moderate amount of fish, and occasionally a small piece of lamb may be added.

In all cases it is better to give small meals several times during the day than to allow a large meal at any one time. The digestion will be greatly assisted by seeing that thorough laxation is attended to.

Where rheumatism can be absolutely excluded, a more nourishing diet—in that it is more nitrogenous—may be permitted. A little cereal in the morning and a small piece of red meat may advantageously be given once a day.

In this disease, the quantity of food given at any one time is of the greatest importance. The digestion must not be taxed, and a great deal more latitude is permissible in regard to the articles of food eaten, if only a very small quantity be given at one time. In severe cases, the food should be entirely liquid, and if necessary, it may be given by the nasal tube. In such cases, milk, eggs and beef tea are the chief articles of the dietary. An adolescent male or female—the usual subjects of severe chorea—should have at least four pints of liquid beef tea or milk with three or four eggs, and as much as four ounces of an alcoholic beverage in twenty-four hours.

Epilepsy—DIET IN EPILEPSY.—Probably there is no disease of the nervous system in which the diet is of so great importance as in epilepsy. In fact, it is of equal importance with the medicinal treatment. It is almost impossible for any case of epilepsy, not traumatic, to recover unless the dietetic treatment is carried out by the patient faithfully and rigorously. It is perhaps not of so much importance what the patient eats, as how much he eats. In all cases of epilepsy, the digestive functions are materially lowered and cannot digest large quantities of food. As a consequence, if the patient eats more than he can digest, the undigested part undergoes putrefactive changes and toxins are formed, which, entering

into the system, are either the original cause of the epilepsy, or are quite capable of producing epileptic attacks which originate from some other cause.

Appetite must be distinguished from hunger. The appetite for food, like all other appetites, is simply a craving on the part of the individual for something that gives him pleasure. We are taught from infancy to control all appetites by reason, except the appetite for food, which we are permitted to indulge without limitation. Almost all people believe they may eat as much food as they please, and so long as they feel no immediate discomfort, conclude that it does them no harm. But such is not the case. In all cases of overeating, toxins are formed, the entrance of which into the system is one of the most frequent causes of epilepsy. It is therefore of paramount importance that the amount of food be strictly limited to a reasonable quantity. In the adult, this can generally be satisfactorily arranged by the instruction of the patient as to the importance of regulating the diet. In children, however, this cannot be done, and a parent or guardian must be instructed in regard to the quantity of food the patient should be allowed to have. In all cases, the physician should impress upon the patient the importance of temperance in diet.

It is difficult, if not impossible, to outline a form of diet suitable to all persons. People differ in their powers of digestion just as much as they differ in personality. It is better to inquire of each patient in regard to the articles of food which are known to disagree with them, and then, of course, to prohibit their use. Nitrogenous foods, such as red meats, peas and beans, salmon and halibut, should generally be excluded from the epileptic's diet, but this is not always a good plan to follow. The idea is that nitrogenous foods more readily undergo decomposition in the digestive tract. This is in the main true, but unless the patient shows some symptom of indigestion, a moderate amount of nitrogenous food is not only harmless, but beneficial to the general economy. A small piece of meat once a day, a spoonful of peas or beans once a day, will not as a general thing prove injurious. Fruits in general may be permitted once a day, but the acid fruits, such as grapefruit, oranges, lemons and limes, should either not be permitted at all, or their effect should be carefully watched. The raw apple has been recommended on account of the vitamins which it is supposed to contain, and which are regarded by some as of great importance in aiding digestion, but in the main the vitamin question may be disregarded. If there is any evidence that vitamins assist the digestion, it is certainly not apparent in the cases of epilepsy. The same may be said of raw cabbage, which also contains vitamins in

abundance. While vitamins may possibly assist the digestion, cabbage, either raw or cooked, is not to be recommended.

Bacon, broiled and free from grease, need not be objected to. In fact there are very few foods which the epileptic may not take sparingly, and there is no necessity for the patient to confine his diet to milk or any of the preparations of soured milk which are so much in vogue at the present time. The main thing is not to tax the powers of digestion beyond their capabilities, and at the same time to provide as much nourishment as the patient can safely take. Alcohol should be forbidden. It is especially dangerous for epileptics. Cases have been known where epileptic seizures only came on after alcoholic indulgence. It can do no good to the patient, unquestionably arrests the process of digestion, and is therefore detrimental to the health.

Simple candies and plain cakes, such as sponge cake, pound cake and ginger bread, may be taken in moderation at meal time, nor is there any objection to a limited quantity of plain ice creams. Where severe intestinal putrefactive processes are known to exist, the diet should be very simple and very limited in quantity, and free elimination of waste products should be insisted upon. In fact it is essential to keep the patient's digestion at its best, and to maintain a thorough elimination from the bowels. Patients whose digestion is very weak and in whom putrefactive decomposition is marked, should be allowed nothing but skimmed milk for the first two or three weeks of their treatment. After that time, if there is no excessive quantity of indican in the urine, the diet may be gradually extended. Simple puddings, such as rice or tapioca, or bread pudding, may be permitted in most cases.

The following is a suitable dietary for the epileptic:

DIETARY FOR THE EPILEPTIC (Craig Colony)¹

Breakfast:

Oatmeal porridge with new milk and sugar; bread and butter, and tea.

Dinner:

Mutton or beef, roast, boiled or minced; fish on Friday; potato, cabbage or other vegetable; jam-roll, or suet pudding, and cooked fruit; alternately with milk puddings, rice, tapioca or sago.

Tea:

Tea, bread, and butter; sometimes sirup or cake.

Supper:

Milk pudding, bread and milk or thick soup, alternately.

¹ For additional dietaries see Volume III, Chapter XXVIII.

The manner in which food is prepared is very important. As a general rule, fried food is interdicted. This is wise on general principles. If the food is fried in deep lard and is served brown and free from grease, a little may be taken with impunity; but if it is cooked sauté—what the Americans call “fried”—and is served greasy, it should not be eaten by the epileptic at all.

On the whole, each individual case must be studied, and when the proper diet for each is ascertained, adherence to such diet, not only for days and weeks, but for months and years, supplemented by suitable medical treatment, renders the prospects of recovery extremely favorable. Unless the diet is rigorously adhered to, medicinal treatment will be in vain.

Hemiplegia.—Hemiplegia, the result of occlusion or rupture of a blood vessel, in reality is a disease of the vascular system, or of the blood, and the consequent hemiplegia is the result of impaired function or destruction of certain nervous structures.

DIET IN HEMIPLEGIA.—The treatment of the condition of hemiplegia, including the dietetic management, is therefore primarily the treatment of the condition which produces the paralysis. In organic disease of the nervous system, no special rules as to diet have as yet been formulated, nor do we know of any diet which will materially modify the progress of the disease. In the early stage of hemiplegia, paraplegia, locomotor ataxia or other paralysis, the diet must be simple, nutritious and not very stimulating. In the early stage of hemiplegia, whether the result of hemorrhage, thrombosis or embolism, the diet must be light, easily digested and—especially if some difficulty to deglutition exists—of a kind to be readily swallowed. If the patient is unconscious, liquid alimentation should be given through the nasal tube; rectal alimentation may have to be resorted to (*see* section on “Rectal Alimentation,” Vol. III, Chap. XXVI, p. 715). As soon as consciousness returns, milk should be given, and for some days following, the dietary should be composed of mainly milk, eggs, beef tea, chicken broth, etc. It must not be forgotten that in some cases there is a natural tendency to a condition in which the disease apparently ceases to be progressive, a condition in which for some unknown reason the supply of poison causing the degeneration seems to be exhausted. Here abundant, easily assimilated food, like milk, eggs and cream, is of great advantage, and this is especially true in cases prone to wasting. The dietary now should consist of toast, fish, chicken or rabbit in the middle of the day. Bread and butter, milk puddings, oatmeal porridge, farinaceous foods and stewed fruits may be allowed. The return to former dietary should be very slow.

Herpes Zoster.—DIET IN HERPES ZOSTER.—In symptomatic zoster, in which the disease is merely a symptom of some other primary disease, such as meningitis, Pott's disease, tabes or vertebral disease, which secondarily involves the posterior spinal ganglia and their roots, there is rarely fever or gastric disturbance, and the diet is therefore a negligible factor in the treatment, unless the primary causative disease requires some special form of diet. In the essential zoster (acute and posterior poliomyelitis) there are several symptoms, such as malaise, fever and gastro-intestinal disorders, pointing to infection.

In such cases it is better for the patient to abstain entirely from food for twenty-four hours. During this time he should preferably remain in bed, drink freely of Vichy or some similar water, and take sufficient saline laxatives to induce a thorough evacuation of the intestine. For the next few days, or until the eruption shows positive signs of waning, starches and proteins should be forbidden. Toast, toasted crackers, zwieback, pulled bread, with such vegetables as spinach, onions, egg plant, artichoke and asparagus, and a moderate quantity of tea or coffee may be permitted. As the eruption disappears, gradual return to normal diet may follow.

Hysteria.—Hysteria is a condition in which the nervous system is deranged, in consequence of which there is a failure in the supply or metabolism of food, especially arising from chlorosis, gastro-intestinal disorders and diseases of the sexual organs. It is a psychical disorder. The cure of a psychical disorder may so impress the patient that the mind will recover its tone. After all, the cure of hysteria rests largely with the patient; if she makes up her mind to get well, she will get well; but until this exercise of the patient's will is brought about, very little real good will result from either medication or dietetic. The greatest benefit accrues to patients whose hysteria depends on chlorosis, atonic dyspepsia, constipation and other disorders of the alimentary metabolic functions, by the means outlined for the relief of these conditions.

DIET IN HYSTERIA.—When isolation can be carried out, the patient should be overfed, the diet consisting of milk, eggs, fish, fowl, bread, butter, jellies, custards, creams, fresh vegetables and fruit. The Weir Mitchell treatment is by far the best method.

Insomnia and Disturbed Sleep.—Persistent insomnia and disturbed sleep, frequently accompanied by dreams, usually of a disagreeable and often of a frightful nature, when not the result of mental strain, anxiety and overwork, can generally be traced to gastric or intestinal indigestion, usually with intestinal auto-intoxication. Even when the disorders of sleep are due to the continuance of painful emotions, a condition of indi-

gestion almost invariably follows. Hence in all cases the digestive powers will be found enfeebled, and not at all adequate to dispose of large quantities of food. An effort should be made at once to arrest the formation of intestinal toxins. This can be done in part by taking care not to overtax the digestive functions, to limit the diet to food easily digested and assimilated, and to promote the thorough and frequent removal of waste products.

DIET IN INSOMNIA.—Meats, such as pork, veal and corned beef, should be interdicted; not because they are *per se* indigestible, but because they are difficult—or rather, because they take a long time—to digest, and severely tax the capabilities of the digestive organs. In consequence, putrefactive products are likely to ensue from their ingestion. Beef and lamb may, as a rule, be taken in small quantities; a small chop, a small piece of steak, or a thin slice of roast beef; or the same meats made into hashes or stews, unless prepared with cream sauces, may be taken once daily every other day. Patients who work at either mental or physical occupations should take the main meal of the day in the evening after work is over. On the days in which beef or lamb are not eaten, the patient may have a piece of chicken, either white or dark meat, or a small piece of plainly cooked fish. Rich cream soups and sauces should not be allowed, but oyster and clam broths, or milk and plain soups may be permitted in small quantities. Fresh vegetables thoroughly and not richly cooked, stewed prunes and baked apples may be indulged in. Such fresh fruit as grapefruit, oranges, pears, melons and berries should either not be eaten at all, or should be given sparingly and their effect watched. Some people can digest these fruits readily, while others cannot. Raw apples and grapes can generally be digested without difficulty. It will be found that even raw apples create indigestion in some people.

Alcoholic drinks should not be permitted as a rule. This applies particularly to cocktails taken before meals, but those who have habitually taken a stimulant with their dinner for years may be permitted to take a glass of whiskey and water with that meal. It will frequently be found that a bread-and-butter sandwich and a glass of beer at bedtime, or the beer alone, will promote better sleep, and obviate the necessity of taking hypnotic medicines.

Tobacco, particularly in those accustomed to it, need not be objected to. Often a smoke before bedtime will quiet the cerebral activity, which prevents sleep, and contribute to a peaceful night, while the deprivation in one accustomed to its use may have just the opposite effect.

The main features to be observed in the diet in this condition are the

avoidance of foods known to disagree with the patient, the limiting of the amount of food taken at any one time, the thorough mastication of all food and elimination of waste products from the bowels.

Migraine and Sick Headache—DIET IN MIGRAINE AND SICK HEADACHE.—Although it has been frequently asserted that the diet in migraine has no profound bearing as an etiological factor on the attack of headache, most victims of this disease know that the ingestion of certain foods and drinks will almost invariably be followed by an attack. Different individuals present widely different idiosyncrasies in regard to their ability to take general articles of food with impunity, and therefore a diet cannot be recommended that will be equally serviceable for all cases. Each case must be studied by itself; the habits of life of each individual should be considered and everything be recommended that will strengthen the body, improve the digestion and increase elimination in a natural way. It is well known that people who live temperately on a general diet, but whose lives are spent in the open air, or who take a great deal of physical exercise, rarely suffer from migraine.

CLASSIFICATION OF HEADACHES.—Harris classifies headache as follows: *Superficial headache* due to: (a) diseases of the brain coverings, (b) pain in the scalp from cellulitis, weight of a hat or mass of hair, (c) pain in the pericranium from rheumatism or syphilis, (d) pain in the bone from caries; (e) reflex visceral neuralgia originating in the condition of the eyes, teeth, lungs, heart, stomach, bowels, etc.

Deep headache due to: (a) reflex cortical neuralgia—e.g., visual “academy” headache, thunderstorm and neurasthenic headaches; (b) toxicemic headaches arising from constipation, sluggish liver, influenza, fevers, alcohol, ether, foul air; (c) increased intracranial pressure—e.g., migraine, epilepsy, tight neck band, cerebral edema due to chlorosis or arterial sclerosis; hydrocephalus; sinus thrombosis; cerebral hemorrhage; acute encephalitis; cerebral abscess or tumor.

Emotional disturbances, which in certain temperaments always diminish the digestive powers, have to be taken into consideration. Almost always those who suffer from migraine are quite well aware that if they eat or drink certain things, they will invariably have an attack. It is therefore superfluous to advise them not to eat or drink those things. It sometimes happens that people can eat or drink things with impunity, which at other times would be followed by the typical headaches; in fact, they may do so many times before they are finally brought to realize it. This points to the conclusion that a person’s digestive powers are not always the same, and that there are times of mental tranquillity and

healthful living when they are free from disease. The explanation is that such wholesome conditions do not permit the formation of toxins or the accumulation of those waste products in the system which in certain neurotics are direct factors in an attack of migraine. Those persons whose lives are sedentary, or who pass a great deal of their time in badly lighted and badly ventilated places, may eat sparingly of almost any kind of food, except, of course, those things which are known to be conducive to attacks.

All should be urged to assist digestion and to promote assimilation of food and the elimination of the by-products of digestion and other accumulations in the system by constant and regular exercise sufficiently violent to cause fairly profuse and sustained sweating. It is absurd to insist on any rigorous form of diet, especially in those whose attacks are very infrequent. There are some who may go for a year or even longer without a headache, while others may have an attack on an average of once a month, or even more frequently. This whole class of cases should observe great care in regard to the quantity of food eaten at any one time; they should not eat between meals and should avoid those foods which, while not indigestible, are difficult to digest, such as pork, veal, corned beef, and richly cooked foods of any kind. Alcoholic drinks in moderation may be taken by some with impunity, but not by others. No hard and fast rules can be laid down on this subject, but each person is a law unto himself, and must find out what his system will tolerate and what it will not. Some find that a sweet champagne will always bring on an attack, while they can take a dry wine with impunity. In others, it is just the reverse. Any amount of wine or liquor will impair digestion in some, while with others a moderate quantity will always assist it. A moderate amount of tobacco does not seem to have any bearing on causing an attack, but its immoderate use may do so by impairing the general health.

Myelitis—DIET IN MYELITIS.—As myelitis is rarely if ever due to toxins found in the gastro-intestinal tract, and as digestive disorders are not a part of its symptomatology, the dietetic treatment is of secondary importance. At the onset and during the development of the inflammatory or degenerative processes, the digestive functions may be depressed on account of high bodily temperature and the general lowering of the vital forces. At this time a light diet of fermented milk, or lactic acid milk, with one or two eggs beaten up in plain milk during the course of the day, will be sufficient. Not more than six or eight ounces of any one of these foods should be given at any one time, but some one of them may be given at three-hour intervals during the day and at night, if the patient

is awake. The food may be given either hot or cold, according to the desire of the patient. A moderate amount of tea or coffee may be added to the milk if desired, to make it more palatable. Hot or cold bouillon or beef tea may be substituted for one of the milk feedings once a day, or, if the patient prefers it, malted milk, imperial granum, or some other similar prepared food.

When the fever abates and the disease no longer shows a tendency to advance, a general diet may be gradually restored, and during the recuperative stage, a full nutritious diet may be ordered, but care should be taken not to give too much food at any one time, otherwise a serious attack of indigestion may ensue as a complication.

When locomotor ataxia is accompanied by gastric crises, the attacks of vomiting are sometimes so frequent and violent that no food at all can be retained. Even a spoonful of milk may be sufficient to incite a severe paroxysm, and the patient may become exhausted to the point of collapse, partly from lack of nutrition, and partly from pain and the violence of the paroxysm. The character of the food which the patient has eaten, has little or nothing to do with bringing on the crisis. The attack generally comes suddenly and ends the same way, and is probably due to inflammatory or degenerative changes in the sympathetic. Diet, therefore, is of secondary importance. While the crisis is present, the patient should abstain from eating any kind of food. Perhaps rectal feeding may be successfully resorted to. Four ounces of milk with a raw egg beaten into it may be injected, but even this method seems sometimes to aggravate the crisis. It is perhaps better to rest, or abort the attack with a large dose of morphine. When the patient is well under its influence, almost any article of food may be retained and digested. Between the crises, the diet should be generally moderate in quantity, but nourishing.

Neuralgia—DIET IN NEURALGIA.—Neuralgia in general may be due to so many different causes that a specific plan of diet is not feasible. The diet must depend upon the causative factor in each case, and therefore the foods permissible in one case must be absolutely forbidden in another. In *neuralgia due to anemia*, the diet should be as full and as plentiful as the digestion will permit. Milk, cream, eggs, rare meat and vegetables, particularly peas and beans, with such fish as salmon, halibut, shad and blue fish, and white or brown bread with a liberal supply of butter, should be given three or four times a day. Simple puddings and custards, ice cream, whipped cream, sugar and high grade chocolate may be permitted in moderate quantities. Coffee or tea, with or without sugar and cream, once a day, may be allowed to those accustomed to their use, and

a glass of Burgundy, claret, Marsala or Tokay once a day with a meal may generally be given with benefit. Many anemic people have feeble digestive powers, so care should be taken not to overtax these powers by feeding too liberally or too often.

This form of diet should also be followed in cases of *tic douloureux* and in other neuralgias due to arteriosclerosis, particularly in old people, and also in those neuralgias due to exogenous toxins, such as the metallic poisons, tobacco and alcohol. Except in the latter case, alcohol should, of course, be absolutely forbidden.

In *neuralgia due to endogenous toxins*, such as occur in diabetes and nephritis, the diet must be very different. It should conform strictly to the rules of the dietary recommended in the general treatment of these diseases. In fact, in some severe cases of diabetic neuralgia, where the non-sugar diet is not followed by relief, it may be necessary to feed the patient for a few days entirely on whiskey and water, and then gradually return to the regular diabetic regimen.

In some severe cases of *nephritis*, it may be advantageous to stop food of any kind, and in its place to give four to six glasses of lemonade a day, for a few days, or until the neuralgia disappears.

In the *neuralgias due to neuritis and perineuritis*, in which rheumatism or gout are usually the determining etiologic factors, the dietary calls for a careful consideration. In general terms, a simple non-purin diet is essential, but there are many cases in which a moderate amount of meat may not only not be prejudicial, but may even be beneficial. Some forms of alcohol may be taken moderately by some people without inducing gout, while others who partake of it will inevitably suffer. It may be stated as a general proposition that those who take regular and systematic physical exercise, and whose bowels move freely, may be more liberal in their diet than those of sedentary habits, and who are more or less constipated. Each case must be considered by itself, and the dietary should be arranged in conformity with the patient's known idiosyncrasies and habits of life.

Neuralgias due to injuries of, or pressure on nerve trunks, do not require any special form of diet.

Reflex neuralgias, such as sciatica due to prostatic disease, or the neuralgic pains accompanying various uterine disorders, only call for special diet when the primary disease or the neuralgia so depresses the system that the digestive processes are interfered with. In such cases the question of diet is more one of the quantity of food permitted at one time, than it is what the patient shall eat. As neuralgia must be regarded sim-

ply as a symptom of some underlying morbid condition, the latter must be sought for and the diet most suitable for that condition be adopted.

Neurasthenia.—*Neurasthenia* (*psychasthenia*, or *nerve fatigue*) is usually shown by irritability or sleeplessness and other indications threatening a nervous collapse. It is a functional neurosis affecting a large class, perhaps increasing in numbers, under the stress and strain imposed upon the nervous system in present day modes of life, in metropolitan centers, by want of proper sleep, lack of suitable food, irregular habits, poor hygienic conditions, etc. This condition is manifested by disorders of function of different parts of the nervous system, without any organic or structural change appreciable by our present knowledge of the anatomy of the nervous system. The term *neurasthenia* covers an ill-defined group of symptoms which may be either general and the expression of derangement of the entire nervous system, or local, limited to certain organs; hence the terms cerebral, cardiac, spinal, sexual and gastric *neurasthenia*.

Cerebral neurasthenia is that variety in which a condition of incapacity for work and for responsibility has been induced by excessive mental work, by constant and onerous responsibility, usually associated with anxiety, worry and mental strain, perhaps also associated with domestic or financial difficulties.

Cardiac neurasthenia is a most distressing condition, in which the cerebro-spinal functions may be only slightly disturbed, while the cardiovascular symptoms may be alarming; again, the conditions may be just the reverse. Palpitation, with irregular heart action, pain and oppression in the cardiac area are the most distressing symptoms.

Spinal neurasthenia is frequently accompanied by pain of a severe character in the back, often throughout the length of the spine, but in many cases much intensified in the cervical region and in the region of the coccyx. Accompanying this pain there is frequently associated weakness of the lower limbs. The knee jerk may be active; there may be pseudo-clonus, but the plantar reflex is not of the extensor type; indeed it may be difficult, or even impossible, to elicit any reflex from the sole of the foot. Such cases are usually of traumatic origin and often referred to as "railway spine."

Sexual neurasthenia is a condition in which there is an irritable weakness of the sexual organs manifested by nocturnal pollutions, unusual depression after intercourse, and often by a distressing dread of impotence, or with remorse for some form of sexual depravity and dread of its consequences—in these cases also the sensations and symptoms pointed out in the cerebral and spinal type may be present.

Gastric neurasthenia or *anorexia nervosa* is a distressing condition with complete loss of appetite, regurgitation, vomiting, and the whole series of phenomena associated with nervous dyspepsia. The subject is usually a young girl between the ages of seventeen and twenty-five. Carelessness about food, with the absence of compelling appetite, lead to irregularity in feeding, the meals are minced over and the patient gradually wastes. The appetite gradually fails until food positively becomes repugnant, so that even moderate indulgence in the most delicate and tasty viands leads to actual retching and vomiting. Such a patient wastes progressively, until at last she is nothing but a living skeleton.

DIET IN NEURASTHENIA.—The dietetic treatment of all these varieties of neurasthenia—and it must be remembered that either sex may suffer—is rest, change of environment, abundant feeding and plenty of fresh air. (For dietary, see Volume III, Chapter XXVIII.)

In neurasthenia there is always impaired digestion, both stomachic and intestinal, and as a result, auto-intoxication from the absorption of intestinal putrefactive products is a factor which has to be considered. The indigestion of neurasthenia is peculiar in that it is not constant for any particular class or classes of food. An article of diet which one day is digested with apparent facility may on another day cause violent indigestion.

As the digestive powers are always feeble, it is imperative that whatever diet is allowed should only be given in very moderate quantities at any one meal. Those foods which, though not indigestible, take a long time to digest, should be omitted from the diet. Pork, veal, corned beef, turkey, salmon, halibut, the various kinds of smoked and cured fish, cauliflower, carrots, beans, rich desserts, pastry and all cream soups and foods cooked in rich sauces should be altogether prohibited. A small piece of beef, lamb or chicken may as a general rule be permitted once a day.

With these exceptions, it is better that the diet should be varied and general, and if laxation and lavage are practiced so as to remove frequently and thoroughly the toxic intestinal contents, and if moderate exercise can be systematically taken, or in lieu of it daily massage, the digestion will be materially aided, and a more liberal diet may be permitted.

The neurasthenic is particularly liable to develop mental irritability, unhappy emotional states and outbursts of or attacks of anger and depression, often from trivial and insufficient reasons. At such times the digestion may be almost completely arrested, no matter what kind of food has been eaten. On the other hand, when the patient is amused, pleasantly interested, and enjoying himself, almost any article of food may be

eaten with impunity. It is better to withhold food altogether during periods of depressing emotional states. At other times, simple nourishing foods of all kinds may be given in moderate quantities. If the patient has been accustomed to tea or coffee, and they do not seem to affect the digestion, either one may be permitted once a day.

There is a large and important group of cases to which Weir Mitchell first called attention, consisting for the most part of women who have become thin, dyspeptic and anemic, who are unable to take exercise without excessive fatigue, in whom even slight exertion causes palpitation. These "high strung" emotional women receive much benefit from the Weir Mitchell rest treatment described in this work (*see* Vol. II, Chap. XVI, "Special Diets and Diet Cures"). The traumatic *spinal cases* are benefited by the *rest cure* of six to eight weeks' duration, especially when the chief features are headache, loss of memory, nervousness, tremors, palpitation and tachycardia, mental depression, etc. The enforced rest in bed should also mean isolation from friends, exclusion of visitors, letters, newspapers, etc. Overfeeding and massage should be resorted to.

In the dietetic handling of the more severe types of neurasthenia, much tact and diplomacy must be used. A capable, kind, sympathetic but unemotional nurse is of first importance. The patient should, of course, be placed in bed, in a large but well-lighted airy room. All visitors, friends and relatives, letters and daily papers should be kept away, and the Weir Mitchell rest cure strictly adhered to.

Gastric neurasthenia or anorexia nervosa, to which reference has been made, must be managed much along the same lines as those just described. The desideratum in anorexia nervosa is to fatten the patient and to improve the condition of the blood and blood-making organs. Rest, isolation, massage and abundant food are the greatest factors in the dietetic handling of these cases, the object of which is to improve nutrition and restore the nervous system to normal function.

In neurasthenia due to toxemia, the alimentary canal should receive first attention, more especially in the presence of impaired metabolism due to protein decomposition. The urine should be examined for indicanuria. The alimentary canal should be cleared out with calomel and salines, and the dietary for the first few days should be milk, four pints a day, beginning with three ounces every two hours, and gradually increasing, until ten ounces are taken every three hours. This should be continued for ten days, after which other foods may be cautiously added, such as a boiled or poached egg, with bread and butter for breakfast, with fish added at the midday meal. As the amount of solid food is added,

the milk may be gradually lessened. The dietary later may be extended until the following is allowed:

DIETARY SUITABLE IN NEURASTHENIA DUE TO INTESTINAL TOXEMIA

First Breakfast—7.30 A.M.

A breakfast cupful of hot milk.

Second Breakfast—8.30 A.M.

Two eggs, boiled or poached, bread or dry toast and butter; China tea made with half a pint of milk.

Lunch—11 A.M.

Three or four oysters with wholemeal bread and butter, or raw-meat sandwiches; a tumblerful of milk.

Dinner:

Six ounces or more of fish, fowl, tender beef or mutton; potatoes, light green vegetables; custard, junket, egg-snow, corn-flour mold, stewed fruit or fresh fruit.

Tea—5 P.M.

China tea made with milk; oysters or raw-meat sandwiches.

Supper—7 to 8 P.M.

Tripe with boiled onions; fish, fowl, rabbit or tongue with bread and butter; fresh fruit; milk and cocoa.

Bed-time:

A tumblerful of milk.

Alcohol in any form should be denied—not because it may arrest digestion by its local effect upon the stomach—but because it aggravates the neurasthenic condition, and in this way weakens the digestive processes. The moderate use of tobacco in habitual smokers often tranquilizes the mind and leads to a feeling of comfort, and in such a case may materially assist digestion.

Neuritis, Multiple Neuritis, Sciatica —DIET IN NEURITIS.—The diet in neuritis depends in a great measure upon the nature of the underlying or constitutional conditions. When it is understood that non-traumatic neuritis is almost invariably the result of toxemia, and also how many and varied are the exogenous and endogenous poisons capable of producing inflammatory changes, either in the nerves or their sheaths, it will at once be perceived how varied must be the dietetic treatment of neuritis in general.

Of all the poisons introduced into the body, alcohol ranks foremost as a cause of neuritis. In such a case it is obvious that the patient should not be permitted to take alcohol in any form unless its sudden withdrawal would be dangerous, when the daily quantity should be gradually reduced

as rapidly as possible. Alcoholic gastritis and severe intestinal indigestion frequently accompany neuritis of this type. If so, they cannot be ignored. The diet should be light, nutritious, and given in small quantities at a time. Malted milk, lactic acid milk, imperial granum and other prepared foods of similar character may advantageously be given. Meat juices and other meat preparations, preserved in alcohol, as most of them are, should not be allowed. Zwieback and toast, with a moderate amount of butter, dry and crisp broiled bacon and a soft-boiled egg, should complete the diet until the symptoms of gastritis disappear. If there are no gastro-intestinal complications, the diet may be general; simply prohibit such things as are known habitually to disagree with the patient. Coffee, tea and tobacco, all in moderate quantities, may be indulged in.

In *neuritis due to metallic poisons*, such as lead, mercury, arsenic, etc., the same rule applies. If there is gastritis, as is always present with some metallic poisons, such as arsenic, for instance, it may be so severe that only very small quantities of milk, with a little egg in it, can be given, and rectal feeding may have to be resorted to for a time at least. If gastritis is not an accompanying symptom—and it rarely is in lead neuritis—the diet may be general, including a moderate use of coffee, tea, tobacco and alcohol.

Neuritis is a frequent symptom of poisons found within the body, such as the intestinal putrefactive products, in diabetes, in rheumatism and in gout. The diet in neuritis of this type must vary in accordance with the disease which causes it.

Intestinal auto-intoxication is more likely to be due to over-indulgence in food than indulgence in any one particular kind of food. Therefore limit the diet to three small meals a day and cut out almost entirely those kinds of food most liable to induce putrefactive decomposition in the intestinal tract, namely, the nitrogenous foods, and forbid those things which delay, impede or arrest the various digestive functions, such as tea, coffee and alcohol. Richly prepared foods, especially cream sauces, should not be allowed. The patient should be instructed to eat slowly and to chew his food thoroughly. Water should be taken freely through the day, but sparingly with the meals, and thorough laxation should be insisted upon.

In *diabetic neuritis*, a diet free from sugar and starch is imperative. Sometimes, no matter how rigorously the diet is enforced, even this will not arrest the production of sugar. It may be necessary in such a case to put the patient to bed and to give absolutely nothing but whiskey and water for ten days or two weeks, or until such time as the sugar is found

to be absent from the blood and urine. Then boiled spinach, boiled onions, beef bouillon, free from grease, a little broiled lean meat, either beef or lamb, and boiled chicken, may be substituted for the whiskey. If this is not followed by a recurrence of the sugar, the diet may be further increased by vegetables of a non-sugar producing kind. Generally such a rigorous diet is not necessary—simply eliminating sugar and starches from the food will be sufficient to free the patient from neurotic symptoms.

Rheumatic neuritis, like diabetic neuritis, should be regarded as one of the symptoms of a general toxic condition, and the principles of diet prescribed for these diseases in the chapters on rheumatism and gout will fill all requirements of the dietetic treatment of these forms of neuritis.

Alcoholic peripheral neuritis is one of the organic nervous diseases in which diet is of much importance. Although most patients suffering from this disorder are generally corpulent and apparently full fed when they apply for treatment, occasionally they are emaciated beyond all proportion to the degree of paralysis. It is frequently observed that even the fat cases after a few weeks of rest in bed and abstinence from alcohol, become actually wasted in physical appearance. The explanation has been offered that such a condition is brought about by the actual neuritis of the vagus branches to the lungs. The dietetic management of these cases is sometimes difficult, owing to the fact that the appetite is often capricious and the stomach irritable, so that it is very difficult to administer the necessary food in sufficient quantity. If conditions permit, the patient should be put on a milk diet, augmented with good beef tea, chicken broth, fish, later with cooked chicken and thoroughly boiled rice, until the stomach can be brought to a condition where it will tolerate a generous diet.

Vertigo—DIET IN VERTIGO.—Vertigo is a symptom of many different pathological conditions, and, therefore, a uniform diet cannot be prescribed. The various causes of vertigo must be considered, and a diet arranged to meet the conditions found to be at the root of each individual case. Labyrinthine disease and lesions in that part of the cerebellum related to the labyrinth cause attacks of vertigo often of the most intensive form. The diet in these cases would be a minor consideration were it not for the fact that vomiting, sometimes distressing in its frequency, is at times a concomitant symptom. When vomiting is absent, there need be no general restrictions in diet except that digestion should not be taxed by too liberal an amount of food, or by food too richly prepared. Alcohol, tea, coffee and tobacco should not be permitted, as they tend to pro-

duce more or less cerebral congestion and intracranial pressure, and may thus aggravate the disease. When vomiting is a symptom, it may be so pronounced that any food, even in very small quantities, is sufficient to induce it. At times it may be necessary to resort to rectal feeding, but when food can be taken by the mouth it is, of course, better to give it that way.

Sea sickness and its prototype, *car sickness*, are caused by a functional disturbance in the labyrinth, and are generally accompanied by vertigo. In these cases, it is better to urge the patient to eat frequently and heartily of any food he can be induced to swallow, even if it is promptly vomited. Persistence in eating will shorten the attack and relieve the vertigo. Strong tea and coffee, either hot or iced, are often beneficial, and alcohol, preferably in the form of champagne, will often give prompt relief for a time at least. Food should be given while the patient is lying down at full length, but not reclining, and if possible in the open air.

Vertigo is a frequent symptom of *cerebral arteriosclerosis*. In these cases a purin free diet is advisable. It is better to exclude all meats except an occasional piece of chicken, such fish as salmon and halibut, and nitrogenous vegetables, such as peas and beans. Coffee and tea should in general not be permitted, but in mild cases a moderate quantity of either may be allowed. Alcohol in any form and tobacco should be forbidden. Both are common causes of arteriosclerosis, and should never be permitted when that disease exists even in a moderate degree.

Vertigo is a common symptom in *neurasthenia* or the so-called *anxiety neurosis*. It is generally dependent upon variations in intra-cranial pressure and cerebral congestion, both of which conditions are influenced by indigestion. In this disease, the digestive powers, both gastric and intestinal, are greatly enfeebled. Great care should therefore be observed in regard to the quantity of food permitted at any one time. In fact, it is more important to regulate the quantity of food taken at a meal than to restrict the diet to certain kinds of food, though foods richly prepared and foods difficult to digest should not be permitted.

Alcohol in any form almost always tends to increase the attacks of vertigo, and the same may be said for strong tea and coffee, though the latter two may generally be allowed in small quantities once a day without any noticeable deleterious effect.

Vertigo frequently accompanies even moderately severe attacks of *intestinal auto-intoxication*. It may indeed be the main or only symptom which engages the patient's attention. Here again the limitation of the quantity of food eaten at any one time, and the restriction of the foods

to those easily digested and assimilated, will usually be sufficient, particularly if the digestive processes are assisted by regular out-of-door exercise, and the toxic contents of the bowels are freely and frequently removed by thorough laxation and lavage. Alcohol, tea and coffee, particularly when they are frequently indulged in, are to most individuals potent factors in causing auto-intoxication. It is better to eliminate them entirely from the diet. Alcohol in itself, without intestinal putrefactive toxemia, may cause attacks of vertigo, by its effect upon the brain cells and the cerebral circulation, in those susceptible to its influence. Tea and coffee may also cause vertigo in rare instances, or when they are taken in immoderate quantities. In such cases, it is only necessary, of course, to stop their use in order to obtain the desired relief.

Vagotonia.—Vagotonic symptoms in the gastro-intestinal tract generally depend upon hyperacidity, hypersecretion, and a spasmodic contraction of the pylorus, or sometimes of the esophagus. There is almost always defective peristalsis, with a good deal of flatulency due to increased muscular tonus. As a result, digestion and elimination are seriously interfered with. On account of the spasmodic closure of the pylorus, the food does not readily pass into the intestine, and much of it remains highly acidulated in the stomach for many hours, causing pain, nausea, and often vomiting.

DIET IN VAGOTONIA.—Under such conditions any form of diet will prove disappointing when unaccompanied by medicinal treatment directed to the relief of the vagotonic condition. A large amount of food, eaten at any one time, only means that a great deal of undigested material will remain in the stomach until it is either vomited or removed by lavage. Alcohol in any form, tea and coffee should not be allowed at all, and richly cooked foods, creamed soups and food served in cream sauces should be eliminated from the diet. A small piece of plainly boiled meat or roast beef, lamb or chicken, with a little plainly boiled and well-salted spinach, boiled onions, beet tops and fermented milk may generally be permitted in small quantities twice or three times a day. It will generally be found that what one person takes with impunity, will in another be followed by a severe attack of pain, vomiting and nausea. Different foods must be tried in different cases, but in no case will any form of diet be successful unless the vagotonic condition is relieved by proper medicinal treatment.

CHAPTER IX

DIET IN DISEASES OF THE GENITO-URINARY TRACT

DAVID GEIRINGER, M.D., and JOHN H. CARROLL, M.D.

SECTION I

DAVID GEIRINGER, M.D.

General Considerations: Classification of Diseases of the Genito-Urinary Tract; Functional Efficiency of the Kidneys.

Surgical Diseases of the Genito-Urinary Tract: Renal Infections; Genito-Urinary Tuberculosis; Cystitis; Urethritis; Urinary Lithiasis; Prostatism.

GENERAL CONSIDERATIONS

With the exception, perhaps, of the disorders of the gastro-intestinal tract, no other group of diseases requires more careful dietetic consideration than those involving the genito-urinary organs.

The physiological activity of these organs, especially those of the urinary tract, is so great and their function so important, that great care must be exercised in the management of any pathological process, whether constitutional or local, which threatens their functional integrity.

In the acute toxic infectious fevers, notably scarlet fever and in metabolic disturbances, such as gout, the kidneys are called upon to excrete irritating toxic products. If this toxic irritation is very great, or if it continues long enough, degenerative changes take place, characterized by destruction of renal parenchyma and connective tissue changes, resulting eventually in renal insufficiency.

In the various local pathological conditions, originating in the genito-urinary tract, such as unilateral renal tuberculosis, pyogenic renal infection with or without calculus, we are dealing with morbid processes which directly attack and destroy renal tissue. It will be shown later how in

unilateral renal disease the functional efficiency of the healthy kidney may be impaired by the toxic products produced by its diseased fellow. Unless every effort is made to protect and conserve the kidney parenchyma by removing the toxic irritation, or if that be impossible, to lessen it, by suitable therapeutic measures and a carefully selected dietary, permanent damage will result.

Owing to the close anatomical relationship between the genital and urinary organs, especially in the male, an infection originating in one tract may involve the other, either by direct surface extension or by way of the lymphatics. Thus tuberculous disease originating in the kidney may descend and involve the prostate, or more rarely, a primary tuberculosis of the prostate may ascend and involve the kidney. Finally, in chronic urinary obstruction due to prostatic disease, the back pressure and urinary stasis will in time cause varying degrees of dilatation of the kidneys and ureters with chronic congestion and infection of these organs.

Classification of Diseases of the Genito-Urinary Tract.—The diseases of the genito-urinary tract which are of interest from the dietetic standpoint, may, speaking broadly, be grouped as follows: nephritis, pyogenic inflammations, tuberculosis, lithiasis and prostatism.

Our knowledge of metabolism in health and disease is far from complete. It logically follows, therefore, that the science of dietetics is not an exact one. So great an authority as von Noorden, when asked to write a book on dietetics, remarked that he did not know enough about the subject. In the past decade, however, great strides have been made in physiology and pathology. As a result of these advances, certain very definite dietetic principles have been developed. In order to apply them to the best advantage, a thorough knowledge of the following is essential:

1. The etiology and pathology of the disease.
2. The effect of the disease upon the functional efficiency of the kidney.
3. Character of the urine: (*a*) amount in twenty-four hours; (*b*) concentration; (*c*) degree of acidity or alkalinity; (*d*) quantitative estimate of urea, uric acid, etc., and (*e*) abnormal constituents—albumin, sugar, casts, mucus, pus, blood, crystals, bacteria, etc.
4. General condition of the patient: (*a*) urinary toxemia; (*b*) urinary sepsis.

The Functional Efficiency of the Kidneys.—The measures employed to determine the nature of the pathological process affecting the kidneys are: (*a*) the physical examination; (*b*) examination of the urine; (*c*) radiog-

raphy; (d) cystoscopy and segregation of urines by ureter catheterization; (e) pyelography.

To determine the functional efficiency of the kidneys, the following tests are employed:

1. Determination of the quantity of urine and the specific gravity.
2. Response of the kidneys to normal physiological stimulation (Albarran's Polyuria test).
3. Methods which determine the power to excrete normal constituents of the urine of foreign substances: (a) total non-protein nitrogen; (b) urea; (c) uric acid; (d) creatinin; (e) lactose, potassium iodid (Schlayer); (f) sugar (phloridzin test); (g) dyes — phenosulphonephthalein (Rowntree-Geraghty), methylene blue, indigo carmine, etc.
4. Methods which require a comparative simultaneous study of the blood and urine: (a) total non-protein nitrogen of the blood and urine; (b) urea of the blood and urine; (c) Ambard's blood urea coefficient; (d) McLean's index of urea excretion.

VALUE OF FUNCTIONAL TESTS.—Too much reliance must not be placed upon the results obtained by the various tests. They simply indicate the ability of the kidney to excrete certain substances at the time the test is made. They give no clue to the etiology or pathology of the condition causing the impairment or whether it is temporary or permanent. Neither do they give any information of the anatomical lesion present. Furthermore, in medical cases, they have as a whole proven singularly inaccurate.

They have proven of most value in surgical conditions affecting the genito-urinary tract. Considered in conjunction with the clinical findings, they help the surgeon to decide upon the efficiency of one kidney when removal of its diseased mate is contemplated; also to determine the advisability of performing other operations, especially upon the aged and in cases of chronic urinary obstruction due to prostatism.

The renal impairment may be temporary or permanent. Thus, in unilateral renal tuberculosis, the functional efficiency of the unaffected kidney may be inhibited owing to the toxins produced by its mate. Nephrectomy removes the source of the toxic irritation, and compensatory hypertrophy with restoration of function promptly follows. If surgical interference is contra-indicated or has been too long delayed, a permanent nephritis of the parenchymatous type results. In scarlet fever and in diphtheria, a similar condition exists. In the early stages there is acute inflammation of the renal parenchyma due to the toxemia, causing vary-

ing degrees of renal impairment. Later, complete resolution may occur or a permanent nephritis result.

The dietetic indications in cases of this type are: (a) *to lessen the work of the kidney* by prescribing food which is most easily excreted by the kidney and whose end products are least irritating to the inflamed renal tissues. Of the three classes of foodstuffs, the proteins are the worst offenders. These will be discussed later.

(b) *To modify the urine.*—The use of water constitutes an important part of the treatment in all inflammations of the genito-urinary tract. Used liberally, when the excretory capacity of the kidney permits, it helps to relieve renal congestion and diminish inflammation. It lowers the concentration of the urine, making it less acid or alkaline, thereby rendering it bland and non-irritating. Lastly, the increased flow of urine tends to flush out mucus, pus or bacteria which may be present in the renal pelvis, bladder or urethra. The amount and varieties of water will be taken up later.

SURGICAL DISEASES OF THE GENITO-URINARY TRACT

Renal Infections.—The surgical inflammation of the kidney, renal pelvis, ureter and perinephritic tissues are microbic in origin and may be caused by any pyogenic organism.

According to the statistics of Legrain, Halle and Albarran(1), the organisms most frequently responsible are: the *Bacillus coli communis*, *Staphylococcus pyogenes*, *Proteus* of Hauser, *Streptococcus pyogenes*, *gonococcus* and *Bacillus typhosus*.

The bacteria may reach the kidney by one of three ways: (a) from the blood stream, usually called hematogenous; (b) through the urinary tract (ascending infection); (c) direct transmission from neighboring organs by way of the lymphatics.

As the terms pyelonephritis, pyonephrosis, suppurative nephritis, perinephritic abscess and pyelitis simply designate which part of the kidney is involved, no attempt will be made to consider them separately, because they are all suppurative inflammations involving different parts of the kidney and pelvis, alone or in combination.

EFFECTS OF PYOGENIC INFECTIONS UPON THE KIDNEY AND PELVIS.—The effects of inflammation depend upon the duration and intensity of the infection. In general, they are: (a) destruction of renal tissue, focal or "*en masse*"; (b) abscess formation; (c) sclerosis; (d) more or less interstitial change; (e) in the pelvis, congestion in acute cases and thickening and sclerosis in chronic states.

If the infection is unilateral, toxic parenchymatous nephritis may result in the opposite kidney from absorption of products of suppuration in its fellow. This lesion is rarely of importance, except in renal tuberculosis. Likewise, compensatory hypertrophy of the healthy kidney occurs, proportionate to the amount of extra work thrown upon it.

The symptoms of renal infection are local and general. The local symptoms are pain and frequent and painful urination; the general disturbance may be due to auto-intoxication from renal insufficiency (urinary toxemia) or to actual septicemia or pyemia.

DIET IN RENAL INFECTIONS.—The dietetic management of renal infections depends upon the intensity, extent and chronicity of the inflammation. In acute febrile cases the diet should be bland and non-irritating, but must be sufficient—40 calories per kilo of body weight are ordinarily required. Speaking generally, about 3,000 should be provided for the average individual. The protein content should not exceed 80 grams.

Milk has been shown to be the best food for the basis of the dietary. It must not be solely relied upon, because its protein content is too high. Approximately two quarts of milk should be given; this furnishes 1,280 calories and 70 grams protein. Toast, cereals with sugar and cream are given to make up the balance. One slice of bread furnishes 100 calories; one ounce of butter, 200; a dish of cereal, 100; one ounce of cream, 50; one ounce of sugar, 120. To increase the calorific value of the milk, milk sugar should be added to the point of toleration. Other forms of milk, buttermilk or acidified milks may be used. Their calorific value is lower, however, than that of ordinary milk.

For drinks, water, lemonade and weak tea or coffee may be given. The sugar added to these is of calorific significance.

In the chronic conditions, a more liberal diet is allowed, with enough variety to preserve the appetite. The dietary prescribed should be along the same lines as in chronic nephritis. The food should be fresh, simply prepared and thoroughly cooked. Three meals a day are given at sufficient intervals, say four to five hours. In general, they include meats in moderation, eggs, fish, fresh vegetables, cereals, bread and simple desserts. Food which irritates the kidney in the process of elimination or disturbs digestion is excluded. This comprises pepper, mustard, condiments, etc., salted, deviled, dried, smoked or preserved meats, rich gravies, pastries, radishes, parsley, onions, celery and asparagus. Alcohol is forbidden.

DILUENTS.—Diluents are especially important in the treatment of all inflammations of the genito-urinary tract. They diminish the density of the urine, not by lessening the output of solids, but by increasing the

watery excretion of the kidney. The kidneys are stimulated to a free physiological action, and the tendency to congestion and inflammation is minimized. The urine itself becomes less irritating, its crystals are more completely dissolved, and it becomes less acid or alkaline. For ordinary dilution, table or re-aërated (not charged) distilled water suffices. For more marked dilution, such as is required in the treatment of pyelonephritis and obstinate bacteriuria, Poland water or any of the alkaline or lithia waters are recommended.

AMOUNT OF WATER.—The amount of water allowed will depend upon the permeability of the kidney to water. In the milder forms of infection, and in those which run a chronic course, the water elimination is usually good. The patient should receive sufficient fluid to bring the urine output up to two liters at least in twenty-four hours, to assure good elimination of nitrogenous waste and other products of inflammation. When there is impaired permeability as shown by edema, which increases with free drinking of fluid, excessive water drinking only does harm. Salt must be used sparingly in these cases. Tea, coffee and tobacco, in moderation, do no harm. A mild cigar after meals in chronic cases seems to aid digestion.

USE OF MINERAL WATERS IN UROLOGY.—All varieties of water ranging from the common table variety to the alkaline or lithia types contain some mineral salts in solution. Distilled and pure rain water are the exception. In the sense in which this term is used by the physician, a mineral water is one which contains a sufficient amount of mineral matter to produce a distinct physiological action, aside from the simple solvent action of ordinary drinking water.

The varieties of mineral waters used in urology, according to Guiteras(2), are:

1. *Table Waters.*—Indifferent or neutral waters containing very little mineral matter.

2. *Alkaline Waters.*—These contain carbon dioxide, sodium and magnesium bicarbonates.

3. *Alkaline Muriated Waters.*—These contain sodium chloride in addition to carbonates.

4. *Earthy Waters.*—Charged with carbon dioxide, containing earthy carbonates and sulphates of calcium and magnesium.

5. *Alkaline Sodium Waters.*—Contain sodium sulphate as the chief ingredient. They also contain sodium bicarbonate and sodium chloride.

6. *Lithia Waters.*

7. *Bitter Laxative Waters*.—Contain magnesium and sodium sulphates chiefly.

1. *Table Waters*.—These mineral waters are mild diuretics and diluents. Whatever physiological action they possess, aside from that of a simple solvent, is due to their carbon dioxid content. They are also mildly stimulating to the digestion and circulation.

Among these are the Poland Spring (Maine) and Great Bear Spring (New York) waters, containing small amounts of alkali. A more alkaline water often used at table in this country is White Rock Spring Water (Waukesha, Wisconsin), containing an appreciable amount of alkaline carbonates. The Apollinaris of Ahrweiler (Germany), the Dorotheenquelle at Carlsbad (Bohemia), the Rosbach and Selters waters (Germany), the Malvern Springs water (England), Condillac (France) and Geyser Spa of California are other examples of simple carbonated waters. (*See also Volume I, Chapters X and XVI—Water in the body and in foods, classification of water and its uses in the body, potable, hard and soft water.*)

Indications: Used as table waters for simple diluent action.

2. *Alkaline Carbonated Waters*.—These include Saratoga Vichy (New York), the French Celestins Vichy, the Salzbrunn and the Neuenahr water (Germany).

Indications: In all inflammatory conditions of the genito-urinary tract, especially of the bladder, oxaluria, lithiasis, gout and uric acid diathesis. Celestins Vichy has proved to be the best all around water of this group.

3. *Alkaline Muriated Waters*.—These include the waters of Selters and Ems, Saratoga Vichy (New York), Plymouth Rock Spring (Michigan).

Indications: Chronic inflammations of the kidney, bladder and pelvis.

4. *Earthy Waters*.—These waters contain large amounts of the sulphates and carbonates of calcium and magnesium, with carbon dioxid and small amounts of iron. They include: Contrexéville (France), Marienbad (Bohemia), Wildungen (Germany), Napa Soda Springs (California), Richfield Springs (New York), Mt. Clemens Spring (Michigan), Allouez and Waukesha Springs (Wisconsin).

Indications: All chronic inflammatory conditions associated with an abundant secretion of mucus, especially in persistent cystitis, chronic gonorrhea, neuroses and hemorrhages of the bladder. They are contra-indicated in the presence of calcium phosphate or carbonate calculi.

5. *Alkaline Sodium Waters*.—The following are the principal waters

of this group: Carlsbad, Marienbad, Franzensbad (Austria); Tarasp (Switzerland); Caledonia Springs (Canada, Ontario); Springdale Seltzer Springs, Boulder County, Colorado; Topeka Mineral Wells (Kansas); Geyser Spa (Hot), Sonoma County, California; Idaho Hot Springs (Clear Creek County, Colorado).

Indications: Gout, lithemia, lithiasis, obesity, chronic nephritis with albuminuria. The waters are always taken before meals, never during or after. They are taken in amounts ranging from six to forty ounces. They are markedly diuretic and in large amounts purgative. They have a solvent action on uric acid crystals.

6. *Lithia Waters.*—These contain usually very small amounts of lithia. The chief foreign lithia springs are at Saltzbrunn, Homburg, Baden-Baden, Ems and Kissingen. A number of lithia springs exist in this country: Arkansas Lithia Springs at Ballardville in Massachusetts, Londonderry Lithia in New Hampshire, Saratoga in New York, Buffalo Lithia Spring in Virginia.

Indications: These waters are used principally as uric acid solvents. Whether they really do this has not been proven. They are diuretic and useful in gout and uric acid calculi. They are taken in the morning, the dose being from 4 to 40 ounces.

7. *Bitter Laxative Waters.*—These contain chiefly sodium sulphate and magnesium sulphate and also magnesium carbonate. A few contain carbon dioxid. The principal bitter waters are: Bohemia: Pullna. Hungary: Alap, Hunyadi Janos, Franz Joseph, Apenta, Victoria. Spain: Carabaña. Germany: Friedrichshall. United States: Crab Orchard Springs, Kentucky.

Indications: These waters have a purgative action and are given in small doses (3 to 8 ounces) in the morning before breakfast.

GENITO-URINARY TUBERCULOSIS

Tuberculosis should always be regarded as a systemic disease, although in some cases it is apparently confined to certain organs. We can never be sure that there is not some other focus of the disease which may give symptoms at some future time, though treatment of the apparently localized tubercular lesions is followed by complete and permanent relief.

Tuberculosis may originate either in the urinary or in the genital tracts. In 279 cases collected by Walker(3), the kidney was the first organ attacked in 184 cases; the epididymis in 80; prostate, 6; Fallopian tubes, 6; seminal vesicles, 2; uterus, 1. Mixed infection occurs early in

urinary tuberculosis. In fact, the progress and symptoms are largely due to the secondary pyogenic infections.

The Kidney.—Miliary tuberculosis occurs as a part of a general miliary tuberculosis disseminated throughout the various organs. Surgical tuberculosis usually begins in one kidney as one or more localized tubercular deposits. The initial lesion usually appears in the renal parenchyma, or in rare cases, the tubercle is situated at the top of the renal papilla (papillary form). Like tuberculosis elsewhere, the process consists first of discrete infiltrations of round cells, followed by necrosis with destruction of renal parenchyma; later, cheesy masses form, surrounded by infiltrated areas. Subsequently these masses break down rapidly as a result of mixed infection, becoming cheesy cavities surrounded by areas of infiltration and interstitial necrosis. These abscess cavities frequently break into the pelvis, infecting it and the lower portions of the urinary tract by direct urinary contamination.

The Renal Pelvis.—The tuberculosis usually consists of a considerable thickening of the wall of the pelvis with ulcerations upon its inner surface. Sclerosis may be so marked in the cellular and fatty tissues about the pelvis, that its cavity may become obliterated, causing renal retention and dilatation.

Tuberculosis in the Ureter.—The ureter may become involved in any portion. The most frequent sites are its upper and lower extremities, although in old cases it may be involved from end to end.

Toxic Tuberculous Nephritis.—In patients suffering from severe tuberculosis in other organs, the kidneys may become the seat of a chronic parenchymatous toxic nephritis, or may show amyloid or interstitial changes.

The Bladder.—Vesical tuberculosis is nearly always secondary to lesions in the kidney or in the prostate, although primary vesical tuberculosis has been reported by Fenwick(4). If the disease descends from the kidney, the lesions begin about the ureteral orifice; if infection comes from the prostate, about the vesical neck. Later there is a general distribution of tubercles throughout the bladder. As the process advances, the mucous membrane becomes congested, thickened, ulcerated and sclerosed.

The Prostate.—Tubercularization begins just beneath the glandular epithelium. It goes through the ordinary stages of caseation and abscess formation, or may terminate in cicatrization.

Seminal Vesicles, Epididymis and Testicle.—These organs may become involved in a diffuse miliary tuberculosis associated with general miliary

tuberculosis. The surgical or circumscribed tuberculosis is at first always unilateral. The lesions are: tubercle formation, caseation and suppuration terminating in fistula or atrophy.

The symptoms of genito-urinary tuberculosis are constitutional and local. The former are characterized by fever and toxemia. The local symptoms depend upon the extent, intensity and the degree of mixed infection. Briefly they are hematuria, painful and frequent urination, local pain and tumor, pyuria, urine that is always acid unless there is a marked mixed infection with ammoniogenic cocci.

In making the diagnosis, the following points must be considered: 1, the presence of urinary tuberculosis; 2, the location of the tuberculosis; 3, if in the kidneys, whether unilateral or bilateral; 4, if one kidney is involved, what is the condition of the other. These questions are determined by, (*a*) examination of the urine; (*b*) physical signs; (*c*) tuberculin tests; (*d*) cystoscopy, and ureter catheterization; (*e*) functional tests.

Treatment is general, surgical and local. The general treatment includes hygienic, medicinal and dietetic measures. The surgical and local treatment will depend upon the location of the tuberculous process.

DIET IN RENAL TUBERCULOSIS.—The dietary in renal tuberculosis should be similar to that of pulmonary tuberculosis, at the same time bearing in mind the principles of feeding described in the section on nephritis. Forced feeding is always contra-indicated, because of the danger of overtaxing the damaged kidney. (For dietary, *see* Volume III, Chapter XXVIII, and Chapter V.)

Of the three foodstuffs, only one, the proteins, makes demands on the kidney. If there is any evidence of incapacity of the kidney in its elimination, its use should be economized. Later, when compensatory hypertrophy takes place and the excretory capacity increases, as shown by the functional tests, an abundant diet may be given for prolonged periods. Speaking generally, about 3,000 calories of food and 100 grams of protein are required in a day. The amount of water allowed will depend entirely upon the ability of the kidney to eliminate it. The same rules in its administration should be observed as described in the foregoing section on nephritis and renal infections.

In urinary tuberculosis involving only the lower genito-urinary tract, the diet should be abundant and nourishing and similar in all respects to that of pulmonary tuberculosis. When there is marked urinary disturbance (frequency, pain, tenesmus), all irritating foods and liquids must be omitted (*see* cystitis, next page).

CYSTITIS

From the clinical standpoint, inflammations of the bladder may be classified as follows:

Traumatic Cystitis.—A mild inflammation or irritability may be caused by concentrated urine containing uric acid crystals, phosphates, oxalates and urates. Gouty cystitis belongs in this class. Rough instrumentation or the presence of a calculus frequently gives rise to a more severe inflammation.

Chemical Cystitis.—Chemical cystitis, due either to the administration of certain drugs, as cantharides, turpentine, excess of alcohol or by irritating local remedies introduced through the urethra, such as silver nitrate, bichlorid of mercury, etc.

Bacterial Cystitis.—This is the type of bladder inflammation generally spoken of as cystitis. It may be acute or chronic.

The active cause of cystitis is infection. The germs producing this infection may be the colon bacillus, staphylococcus, streptococcus, gonococcus, tubercle bacillus, pneumococcus, proteus vulgaris and urobacillus liquefacien septicus. The bacteria may reach the bladder, (*a*) from the kidney; (*b*) from the urethra; (*c*) from the blood or lymphatics; (*d*) by direct entrance from adjacent organs.

Bacteria reaching the bladder will not cause inflammation unless certain predisposing causes exist. Briefly stated, these are:

1. Congestion due to retention.
2. Trauma by stone, foreign body, instrumentation.
3. Disease of the bladder wall, such as tumor, tubercle or simple ulcer.
4. Disease extending to the bladder from the ureter, urethra or neighboring tissues.
5. Paralysis of the bladder.

Acid cystitis is caused by the colon, tubercle, typhoid bacillus or gonococcus. Alkaline cystitis is due to staphylococcus, streptococcus or proteus vulgaris.

The symptoms of cystitis are frequent and painful urination and pyuria.

DIET IN CYSTITIS.—The use of all irritating drugs either by mouth or applied through the urethra should be stopped during the acute stage. Asparagus, grapefruit, strong coffee and lemon juice should be prohibited. Alcohol, ale, beer, cider, ginger ale, spices and condiments are not allowed. The diet must be light and laxative, because a constipated bowel threatens

infection as well as congestion. Meats should be replaced by vegetables and cereals. Fruits may be cautiously given. Finally the patient must keep the urine bland by drinking plenty of water.

In gouty cystitis, the waters of Contrexéville and Wildungen will be found beneficial. Celestins Vichy is useful as in the other types of acute cystitis.

In chronic cystitis, the urinary hygiene, the condition of the bowels and the quality of the urine constitute the palliative part of the treatment, while the active work is done locally. The specific gravity of the urine should be kept preferably below 1015, if the renal condition permits. This is attained by making the patient drink plenty of water. The mineral waters are useful in this connection. For description of various kinds of water and special indications, see Volume I, Chapters X and XVI.

URETHRITIS

This includes, strictly speaking, any inflammation of the urethral canal due either to gonococcal or other infection, to traumatism, foreign bodies, tuberculosis, venereal sores (chancre and chancroid) and neoplasm. To the above may be added gouty urethritis and urethritis due to the ingestion of certain substances which when taken in excess occasionally produce a mild inflammation. Excessive amounts of whiskey, beer or wine will occasionally produce a urethral irritation with discharge. Cantharides, potassium iodid, turpentine, asparagus and arsenic may produce similar effects.

The symptoms of acute anterior urethritis due to the gonococcus are swelling, redness, eversion and sometimes erosion of the meatus, a discharge of thick greenish-yellow pus, painful urination and chordee. When the posterior urethra is invaded, urination becomes more frequent and urgent, and there may be terminal hematuria depending upon the intensity of the inflammation. The urine always is cloudy, due to pus. In anterior urethritis, the first part voided is always cloudy, while the second glass is clear. When the posterior urethra is involved, both glasses are cloudy.

The complications of urethritis, of interest from a dietetic standpoint, are acute prostatitis, prostatic abscess, seminal vesiculitis, epididymitis and arthritis. They often give rise to severe fever ushered in by chill.

Gonorrhea becomes chronic because the lesions caused by the gonococcus persist. The infectious agent of urethritis may be the gonococcus, alone or in connection with other bacteria, or simply other bacteria without the gonococcus.

Dietetic Indications in Urethritis.—The dietetic indications in urethritis, acute and chronic, and its complications are, (a) to render the urine bland and non-irritating; (b) to insure a copious urinary output, in order to flush out the bladder and urethra, thereby lessening congestion and inflammation and inhibiting bacterial proliferation; (c) to avoid all irritating foodstuffs. (See dietary, Volume III, Chapter XXVIII, page 803.)

The patient is instructed to drink freely of water. If there is much burning on urination, alkaline diluent waters such as Celestins Vichy and Apollinaris are recommended. Eight to twelve glasses a day are usually sufficient. Some patients make the mistake of drinking enormous quantities of water; this is entirely unnecessary and in very acute posterior urethritis and acute gonococcal cystitis more harm may be done by the muscular straining and tenesmus resulting from the frequent repetition of the urinary act than is atoned for by any amount of dilution of the urine.

In the acute stage, the patient must abstain from liquors, wines, beers, ales, ginger ale and cider. Coffee and tea in moderation do no harm, but in large quantities, especially when taken in the evening, frequently increase the general and local nervous irritability.

DIET IN URETHRITIS.—Regarding the diet, the rigorous régime formerly advised is no longer employed. Unless there is fever or some special contra-indication (nephritis, gout, etc.), a generous mixed diet is allowed. All foods should be avoided which give rise to irritating substances in the urine, such as tomatoes, asparagus, rhubarb, lemons, grapefruit, and all sour, pickled and spiced dishes, especially condiments such as pepper, mustard and horseradish sauce, catsup, etc. Keyes' (5) rule that any substance which burns the palate as it enters the body, will burn the urethra as it issues, is an excellent one.

In chronic urethritis, the patient may with benefit to himself be allowed greater liberties. The diet should be full and stimulating. Regarding alcohol, all agree that it is universally harmful as long as gonococci are present in the discharge. After the gonococci have disappeared, habitual drinkers may be allowed to return gradually to the use of alcohol. Claret mixed with water is the least harmful; of the liquors, Scotch whiskey is preferred, two one-ounce drinks a day diluted with Vichy or water are allowed. Beer and ale are the most irritating and must be used with great caution. In conclusion, it may be stated that alcohol is harmful in any acute inflammation of the genito-urinary tract and in the acute exacerbations of chronic inflammatory conditions. When these become chronic, its gradual resumption by habitual users is allowed and fre-

quently has a beneficial effect, not only on the patient's mind, but also upon his local catarrh.

URINARY LITHIASIS

A calculus may form in any part of the urinary tract. The term nephrolithiasis is used to designate calculus formation in the kidney. Stones originating in the upper urinary organs may remain there or may pass into the bladder, either to be expelled through the urethra or to form the nucleus of a bladder stone.

The predisposing causes which lead to stone formation are imperfectly understood. Opinions differ as to the influence of race, sex, habits, age, heredity, etc. Lithiasis is more common in the tropics, probably because less water is excreted by the kidneys and more through the skin. The deficient intake of water is a common fault, and in all probability is an aggravating cause. Water containing an excess of calcium salts is considered an important predisposing cause of calculi, because inhabitants of chalk or limestone districts suffer frequently from stones. A sedentary life, excess of rich animal food and alcohol are also blamed for stone formation. An excess of purin bodies in a rich animal diet is likewise held responsible for the origin of uric acid gravel. A vegetable diet rich in oxalates, phosphates and calcium salts is undoubtedly a predisposing cause in certain cases of primary oxalate and phosphatic calculi.

Although observers differ as to the exact etiology of lithiasis, most are agreed that an excess of animal or vegetable diet and a deficient daily intake of plain water are the most important predisposing causes.

Consideration of Two Classes of Calculi.—Calculi may be divided into two classes:

1. *Primary stones* which develop without any evidence of antecedent inflammations. They consist of one or more of the following substances: uric acid, urates, calcium oxalate, calcium carbonate, acid or basic phosphates of calcium, cystin and xanthin.

2. *Secondary stones.*—These develop in the urine as the result of bacterial inflammation. Certain bacteria can split urea into ammonium carbonate and ammonia, making the urine alkaline and ammoniacal, so that crystals of triple phosphates and calcium carbonate are precipitated, which collect upon the albuminous inflammatory products in the urine or shreds of fibrin, pus or blood clot lying on the surface of the pelvic mucous membrane.

Secondary calculi consist of phosphates of ammonium, calcium and magnesium. Often they are formed around primary stones.

The injuries which the various organs may suffer from the presence of the stone are many. Obstruction in the kidney and ureter leads to hydronephrosis, infection to pyonephrosis, and finally mere mechanical irritation may cause various degenerative changes. In the bladder, congestion is invariably present, followed sooner or later by infection and inflammation, resulting in chronic cystitis. Ulceration is not uncommon.

The treatment of lithiasis is surgical and medical. These measures include, (*a*) removal of the stone; (*b*) the cure or control of the inflammation causing or complicating the stone; (*c*) dietetics; (*d*) dilution of urine; (*e*) exercise encouraging elimination by other avenues.

DIET IN RENAL LITHIASIS.—The dietetic management of lithiasis has for its object the prevention of calculus recurrence after the stone has been passed or removed. The selection of the diet will depend upon the following: (*a*) the composition of the stone and the character of the crystals in the urine; (*b*) the condition of the kidneys; (*c*) the presence of infection.

In outlining the diet, certain fundamental principles must be observed in all cases.

In nephrolithiasis, the diet is especially important. The renal parenchyma is always damaged, and the diet must therefore be that of nephritis, modified according to the crystals in the urine.

The food must be simple. All rich foods and a multiplicity of courses are prohibited. The amount of food should be sufficient, but not in excess of the requirements of the individual; 40 calories per kilo is a safe amount to begin with. If the stone consists of *oxalates*, or if these crystals are present in the urine, foods which contain an excess of oxalates are prohibited.

Nearly all vegetables, except peas and beans, are forbidden, (*a*) because of the large amount of oxalates they contain, and (*b*) the large amount of calcium present which renders the oxalates less soluble. Spinach and rhubarb are especially to be avoided. Of the fruits, strawberries, apples, pears and figs should be omitted (*see* section on oxaluria). Meats are allowed more freely, except glandular foods, liver, thymus, etc., and gelatin, which, according to Klemperer(6), give rise to oxalic acid in the process of digestion.

When the calculus is composed of uric acid, or these crystals are present, meats should be reduced in amount, especially kidney, liver, brain or sweetbreads. No smoked, corned or highly seasoned food and rich pastries are allowed. The amounts of milk, vegetables and fruits are increased.

Sugars and fats are given in moderation (*see* section on uric acid diathesis).

When the calculus is phosphatic, meats are increased and vegetables diminished (*see* section on phosphaturia). Owing to the mixed composition of the stone, it is often impossible to decide upon the exact nature of the metabolic disturbance. In these cases, it is best to prescribe a mixed diet, which experience has shown most suitable for man.

Enough water should be given to keep the specific gravity of the urine below 1.015. So long as this is done, the likelihood of stone formation is relatively slight. In uric acid diathesis, the waters of Contrexéville in France, of Wildungen in Germany, and the alkaline diuretic waters are recommended. In oxaluria, carbonated alkaline waters, such as Apollinaris, are advised. Patients who have difficulty in keeping their urine diluted are frequently greatly benefited by occasional courses at a diuretic or cathartic mineral spring, such as Contrexéville, Carlsbad or French Lick.

The use of alcohol in any form is prohibited, because it has been definitely shown that its ingestion interferes with all metabolic processes.

PROSTATISM

The clinical term "prostatic hypertrophy" has been loosely applied to different forms of prostatic disease, causing obstruction to the outflow of urine through the urethra in men over 50. Our increased knowledge of the pathology of the disease has rendered the term obsolete, so that at present the term prostatism is used to designate an adenomatous or fibrous condition of the prostate causing urinary obstruction.

SYMPTOMS OF PROSTATISM.—Prostatism is a disease of later life. Symptoms usually appear after 50. According to Thompson(7), 34 per cent of men reaching the age of 60 have enlarged prostates, and less than half of these suffer from prostatism. The size of the prostate bears no relation to the age of the patient or to the symptoms. In the great majority of cases, the disease consists of the formation of benign adenomatous tumor masses within the gland. In the remainder it is due to malignancy or to a fibrosis resulting from chronic prostatitis. According to Albarran, about 15 per cent of so-called benign adenomatous prostates show malignant changes at the time of removal.

The symptoms of prostatism do not appear until the obstruction to the flow of urine produces retention. It may exist for years without causing symptoms. Briefly considered, the symptoms of retention are:

Nocturnal frequency of urination, and painful and difficult urination. As the residual urine increases and infection appears, there is frequency by day as well as by night. As a result of alcoholic excess or overeating, exposure to wet and cold, acute congestion of the prostate may suddenly occur, causing complete retention.

Cystitis is the most common complication of prostatism. Prostaties are peculiarly subject to calculus formation in the bladder. This may cause marked symptoms of vesical irritability, or none whatever, if the stone lies behind a large prostate and does not irritate the vesical neck. It frequently is not suspected until its presence is disclosed by cystoscopy or operation. As a result of chronic cystitis and the continuous back pressure, varying degrees of dilatation of the ureters and kidneys take place with infection of these organs. The patient then begins to show signs of urinary sepsis and renal insufficiency.

Treatment of Prostatism.—The management of prostatism depends upon the degree of obstruction and the general condition of the patient. In early cases, with proper local measures and a carefully regulated hygienic diet, he may go on for five, ten or fifteen years with very little trouble beyond an occasional attack of retention. As Keyes(8) aptly remarks, "The prostatic resembles the menstruating woman in that any exposure or over-exertion reacts promptly upon his pelvic organs." His clothing should be warm enough to ward off the risk of sudden chill. Anything likely to cause congestion of the pelvic veins must be avoided, such as indulgence in bulky meals, heavy wines and beers. Of alcoholic beverages, he may drink whiskey (preferably Scotch), gin and light wines in moderation. The best drinks are milk and the various diuretic waters.

The general hygiene of the body must receive attention, keeping the skin clean by regular bathing and friction with a rough towel. Light exercise and fresh air are beneficial, but any excess, whether physical, sexual, mental or alcoholic, must be avoided.

DIET IN PROSTATISM.—The most suitable diet is planned along lines recommended for gouty patients. Small, choice meals should be ordered, consisting of lean meat, poultry, game, fresh fish, eggs, milk and cheese. Meats should be largely replaced by vegetables and cereals. Fats and sugars are used in moderation. White meats are preferred to the red. Cellular organs, such as sweetbreads, kidney, liver, and meat extracts, tea, coffee and cocoa, must be restricted.

Copious flushing of the urinary tract by the intake of plenty of water should be encouraged, providing the condition of the kidneys permits. Alkaline mineral waters of low salt content, such as Contrexéville, Vittel,

Vichy, potash, lithia and magnesia waters, and aërated distilled waters are especially valuable. For those who suffer from oxaluria, Kissingen and Hunyadi waters are recommended, with a suitable diet (*see* oxaluria). Lime-containing waters, such as Apollinaris, Rosbach, Johannis and Kronthal, should not be used.

REFERENCES

1. LEGRAIN, HALLE and ALBARRAN. Guyson's Annals, 1898, xvi, 1159.
2. GUITERAS. Guiteras' Urology, 1912, vol. i, 338.
3. WALKER. Annals of Surgery, 1907, xlv, 249.
4. FENWICK. Ulceration of the Bladder, London, 1900.
5. KEYES. Urology, 1917.
6. KLEMPERER. Matthes. Lehrbuch d. klin. Hydrotherapie, Jena, 1903, 34.
7. THOMPSON. International J. Surg., 1899, xii, 98.
8. KEYES. Urology, 1917.

SECTION. II

JOHN H. CARROLL, M.D.

Diet in Diseases of the Genito-Urinary Tract (continued): Nephritis—Acute Degenerative and Inflammatory Nephritis; Clinical Types of Chronic Renal Diseases; Gouty Kidney, Stasic Kidney, Bichlorid Nephritis, Acidosis; Uremia; Oxaluria and Indicanuria; Phosphaturia; Polycystic Kidneys.

NEPHRITIS

Considerations in Study of Nephritis.—Countless varieties of clinical types, due to derangement of kidney function, are met with in everyday practice. Tubular degeneration exists with arterial and glomerular sclerosis in an endless variety of combinations, and it is only by a knowledge of the relative derangement of the individual functions that we are

able to direct management and therapy intelligently. A great amount of progress in our study of nephritis has its stimulus in the methods of determination of kidney activity by the quantitative estimation of excreted chemicals and dyestuffs, either those normally found in the urine, or foreign substances injected or fed.

Recently, to supplement these tests, Hedeyer and Schlager(1) proposed a qualitative test of urinary function as measured by the specific gravity, salt, nitrogen and water excretion in two hourly periods. Determination of absence or intensity of impairment was found to be possible by this method. Various workers in this country, including Christian(2) and his school and Janeway(3) and his school, materially amplified this work. The following test meal is recommended by Mosenthal(4) as suitable for use by general practitioners:

NEPHRITIC TEST DIET (Mosenthal)

All food is to be salt-free food from the kitchen.

Salt for each meal will be furnished in weighted amounts below.

All food or fluid not taken must be weighed or measured after meals and charted in the spaces below.

Allow no food or fluid of any kind except at meal times.

Breakfast—8 A.M.

Boiled oatmeal.....	100 gm.
Sugar	1-2 teaspoonfuls
Milk	30 c.c.
2 slices bread	60 gm. each
Butter	20 c.c.
Coffee.....160 c.c. }	
Sugar, 1 teaspoonful }	200 "
Milk.....40 c.c. }	
Milk	200 "
Water.....	200 "

Dinner—12 M.

Meat soup.....	180 c.c.
Beefsteak	100 gm.
Potato (baked or boiled).....	130 "
Green vegetables as desired.	
2 slices bread	60 gm. each
Butter	20 "
Tea.....180 c.c. }	
Sugar, 1 teaspoonful }	200 "
Milk.....20 c.c. }	
Water.....	250 "
Pudding (tapioca or rice).....	110 "

Supper—5 P.M.

2 eggs, cooked in any style.	
2 slices bread.....	60 gm. each
Butter.....	20 "
Tea.....180 c.c.	
Sugar, 1 teaspoonful }	200 c.c.
Milk.....20 c.c. }	
Fruit (stewed or fresh).....	1 portion
Water.....	300 c.c.

8 A.M.

No food or fluid is to be taken during the night or until 8 o'clock the next morning (after voiding), when the regular diet is resumed.

Patient is to empty bladder at 8 A.M. and at the end of each period, as indicated below.

The specimens are to be collected for the following periods in properly labeled bottles:

One capsule of salt containing 2.3 gm. of sodium chlorid, is furnished for each meal. The salt which is not consumed is returned to the laboratory where it is weighed, and the actual amount of salt taken is calculated.

8 A.M.—10 A.M.	12 M.—2 P.M.	2 P.M.—4 P.M.
4 P.M.—6 P.M.	6 P.M.—8 P.M.	8 P.M.—8 A.M.

DIET IN NEPHRITIS.—The diet contains approximately 13.4 grams of nitrogen, 8.5 grams of salt, 1,780 c.c. of fluid and a considerable quantity of purin material in meat, soup, tea and coffee, and it is on the mode of excretory response that the study of renal function depends.

The most important points observed in the normal individual's response to the nephritis test meal are: (a) variation in the specific gravity of the urine specimen (usually 10 points or more); (b) the balance between intake and output of salt, nitrogen and fluids should be approximately equal; (c) a night urine high in specific gravity, 1.016, but usually 1.018 or higher. High in percentage of nitrogen in the specimen above 1 per cent, and small amount of fluid, 400 c.c. or less, regardless of the quantity of fluid ingested or amount voided during the day.

The points indicating renal insufficiency in chronic interstitial nephritis, *i.e.*, primary or secondary contracted kidney: (a) are markedly fixed and low specific gravity; (b) diminished output of both salt and nitrogen; (c) tendency to total polyuria; (d) night urine showing slight or marked increase in volume, low specific gravity and low nitrogen percentage.

Response in renal congestion (myocardial insufficiency) shows: (a) specific gravity markedly fixed at a level of about 1.020; (b) a diminished output of salt—the low percentage figures are striking; (c) an adequate nitrogen output—this being in marked contrast to salt; (d) an oliguria; (e) a night urine normal in character.

After compensation is established, during the elimination of edema

because of the existing polyuria, the following characteristics are found: (a) specific gravity low, somewhat fixed; (b) nitrogen normal; (c) salt and water elimination exceeds intake; (d) night specimen is increased in amount, has low specific gravity and low percentage of nitrogen.

After the edema has disappeared, the kidney does not return to normal but exhibits certain decided peculiarities: (a) low, markedly fixed specific gravity; (b) normal nitrogen and water output; (c) slightly diminished salt output; (d) night specimen may be increased, the salt and nitrogen percentage being very low. These functional disturbances persist for months. The response to the nephritis meal in chronic parenchymatous nephritis very closely resembles the response in myocardial decompensation in the edematous, post-edematous and convalescent stages. Hypertensive nephritis complicated with decompensation may yield a response characteristic of either, but the clinical evidence aids materially in making a diagnosis possible.

Anatomical lesions in nephritis attract our interest in so far as they allow a better understanding of the disturbances of function which are a source of discomfort or may hasten death. Important contributions, correlating the symptomatology, functional derangement and pathology, have recently been published, notably the monograph of Volhard and Farr(5), and reference to this work will be made as a basis for the selection of diet.

CLASSIFICATION OF NEPHRITIS.—Volhard and Farr classify acute nephritis into two main groups—acute degenerative and inflammatory. Degenerative nephritis includes the types associated with degeneration or necrosis of the tubules without glomerular change or at most congestion, with a small amount of albuminous exudate. Clinically, the characteristic symptom is edema. Cardiac hypertrophy and high blood pressure are absent. Albumin is abundant in the urine; no red cells are found, but there are characteristic, doubly refractive bodies, previously believed to be fatty globules but now recognized to be bipolar bodies, cholesterin esters.

The functional disturbance in this type of nephritis is relative and absolute impairment of salt elimination. Nitrogen excretion being normal, edema increases with salt intake, but occasionally retention occurs without reduction of urinary output or the development of edema. This is called dry salt retention. It is probably found in kidneys with glomerular lesions without the extra renal cause for fluid retention asphyxia of the cells.

Because of its interest at this time, and its bearing on the dietetics

of this type of nephritis, the theory of Martin Fischer(6) is of interest. He concludes that swelling of the tissue protoplasm is due to cellular acidoses causing colloidal swelling by attracting water. The treatment he outlines is alkali salt therapy. This is very well substantiated experimentally, and in carefully selected cases yields striking results in treatment. Varied results of this method of treatment are probably due to its use in cases where factors other than cellular acidosis existed, such as vascular and glomerular disease.

DIET IN ACUTE DEGENERATIVE NEPHRITIS.—The dietary management of this type, supplementing and following the alkali salt therapy, is concerned principally with a selection of food designed to lessen the acid and increase the alkali content. The subjoined tables indicate the acid-forming and base-forming values of food:

FOODS IN WHICH ACID-FORMING ELEMENTS PREDOMINATE

Beef free from visible fat.....	10.
Eggs.....	9.
Round steak.....	6.7
Oatmeal.....	3.2
Wheat flour.....	2.7
Wheat (entire grain).....	2.6
Rice.....	2.4
Bacon.....	1.0
Corn (entire grain), high protein.....	0.1
Estimated excess of acid-forming elements equivalent to c.c. normal acid per 100 calories.	

Particular attention is directed to the restriction of phosphate in foods and the presence of calcium. Marriot and Howland of Baltimore(7) submit data of considerable bearing on feeding in nephritis. They found inorganic phosphorus—in many times the normal amount—in every case of nephritis with acidosis. Simultaneous determinations of its combination with CO_2 of the serum showed that in certain instances the CO_2 had combined with twice as much of the available base, in striking contrast to the normal, in which the base combined with phosphoric acid is only one-tenth to one-fifteenth of that combined with CO_2 . They demonstrated that it was specific in the acidosis of nephritis and did not occur in acidosis of other diseases; they found its retention not a part of general salt retention, and suggested its possible relation to edema. They conclude their report by showing that the calcium content of the serum is lessened, and that calcium in the body aids materially in the elimination of phosphates, offering the suggestion as a rational therapeutic procedure.

PHOSPHORUS-CONTAINING FOODS¹Contents estimated at P_2O_5

Fruits.....	15%- 12%	Pears, apples, citron, plums, cherries, apricots, oranges, figs.
Berries.....	20%- 13%	Gooseberries, currants, strawberries, huckleberries.
Nuts.....	43%- 18%	Almonds, cocoanuts, chestnuts.
Cereals.....	54%- 17%	Rice-flour, rice, wheat-flour, buckwheat-flour, oatmeal, oatmeal-flour, barley meal, barley-flour, rye-flour, cornmeal, cornmeal-flour, rolled oats, pearl barley, macaroni, brown bread, white bread.
Vegetables.....	41%-105%	Black radishes, artichokes, beans, peas, lentils, pumpkin, kohlrabi, cauliflower, asparagus, potato, cabbage, savory cabbage, mushrooms, onions, rhubarb, cucumbers, turnips, celery, carrots, sugar beets, radishes, spinach.

CALCIUM IN FOOD²

<i>Basal Foods:</i>	Per cent	<i>Vegetables—(Continued)</i>	Per cent
Meat.....	.002	Lettuce.....	.425
Eggs.....	.100	Onions.....	.040
Cream.....	.147	Parsnips.....	.076
Milk.....	.172	Peas, dried.....	.138
Cheese.....	1.240	Potatoes.....	.016
Bread.....	.021	Pumpkins.....	.032
Flour—Fine.....	.028	Radishes.....	.025
Whole wheat.....	.037	Rhubarb.....	.060
Cornmeal.....	.009	Rutabaga.....	.103
Rice.....	.012	Spinach.....	.064
Pearl barley.....	0.25	Tomato.....	.019
Macaroni }.....	.028	Turnips.....	0.87
Vermicelli }.....	.028	Vegetable marrow.....	0.32
Oatmeal.....	.078	Watercress.....	.259
<i>Vegetables:</i>		<i>Fruits:</i>	
Potatoes (sweet).....	.025	Apples.....	.011
Asparagus.....	.038	Apricots.....	.021
Beans—Dried.....	.215	Bananas.....	.009
Fresh.....	.073	Blackberries.....	.099
Beet-root.....	.019	Bilberries.....	.045
Cabbage.....	.058	Cherries.....	.026
Carrots.....	.077	Cranberries.....	.021
Celery.....	.094	Currants.....	.046
Cucumber.....	.028	Currants, dried.....	.169
Greens, turnip tops.....	.508	Grapes.....	.014

¹For other phosphorus-containing foods, see Volume I, Chapter XI, page 272.²For additional calcium-containing foods, see Volume I, Chapter XI, page 265.

CALCIUM IN FOOD—(Continued)

<i>Fruits—(Continued)</i>	Per cent	<i>Fruits—(Continued)</i>	Per cent
Grapefruit.....	.029	Pineapples.....	.008
Huckleberry.....	.037	Plums.....	.022
Oranges.....	.043	Raspberries.....	.012
Peaches.....	.015	Strawberries.....	.057
Pears.....	.018	Watermelon.....	.018

Inflammatory Nephritis.—Inflammatory nephritis includes glomerular nephritis and focal nephritis. It includes also the greater number of cases of nephritis, and is the type associated with renal functional impairment, arterial hypertension and uremia. Anatomically, there is exudation and proliferation in and about Bowman's capsule, with swelling and varying degrees of degenerative change in the cells of the glomerular tuft, associated in a considerable number of cases with changes in the tubular epithelium, but the glomerular lesion and the resulting impairment of renal function overshadow and often mask the tubular element.

Arterial hypertension is a concomitant of glomerulitis. Vascular changes and erythrocytes in the urine are often the only signs present. Realizing the meagerness of the diagnostic data in glomerular inflammation, which usually develops in the course of acute systemic disease such as tonsillitis, scarlet fever, sepsis, etc., the significance of these signs is readily understood.

The functional derangement in this type includes impairment of the chlorid and nitrogen elimination, with a pronounced accumulation of the latter in the blood, resulting in a high non-protein nitrogen retention.

Oliguria up to absolute suppression is present in some cases, and on these factors is dependent to considerable extent the nitrogen retention. Catabolism is a factor of considerable import, as pointed out by Mosen-thal. Varying degrees of kidney insufficiency, varying degrees of oliguria, and associated nephrosed or tubular degenerations exist, and materially influence the determination of dietetic restrictions. The essential point is the character of the anatomical lesion and its results. The problems in the management of acute glomerular nephritis are prevention of intoxication of the patient by the retained waste products, prevention of accumulation of fluids in the body spaces and tissues, protection of the kidney tissue against injury, while the infection is being overcome.

In acute nephritis, retention of waste products in the blood, determined by an estimate of the blood urea or non-protein nitrogen, is dependent in a great degree on the associated oliguria. This is because a great number of glomeruli are temporarily but completely out of action, the

remaining glomeruli being unable to eliminate the total waste in the scanty, highly concentrated urine. Increased protein catabolism contributes to some extent, because of increased tissue destruction. Estimation of the total solids in twenty-four hours will roughly yield the information whether the kidney is eliminating a sufficient amount. If retention is present, a carbohydrate diet is indicated.

The essential fact to be kept in mind in determining our procedure in the management of acute glomerular nephritis is the existing inflammatory lesion in and about the glomerulus. There is exudation, swelling and edema of the cells of the tuft and proliferation of fixed cells in and about the glomerular tuft. The degree of destruction and amount of fibrosis from proliferation of the fixed cells is dependent on the amount of strain or call for support placed upon the glomerulus. Experimentally and clinically, we have evidence to justify the statement that water and salts, as definitely as waste material from protein cleavage in their elimination, places a call and consequently a strain on the kidney. Hence the need of restriction of these in the management of acute glomerular nephritis.

DIET IN ACUTE NEPHRITIS.—As a rule, food is refused voluntarily or involuntarily by the person ill with acute nephritis. Varying degrees of illness and toxicity exist. Some of these patients can retain and assimilate food; others are too ill and the stomach too irritable to admit feeding.

The following foods are used in the diet of acute nephritis:

	Per cent Nitrogen
Baked apple.....	.04
Stewed prunes.....	.14
Hominy cornstarch cereals.....	.13
Baked potato.....	.48
Mashed potato.....	.40
Cream.....	.41
Blackberry cornstarch pudding.....	.05
Prune cornstarch pudding.....	.07
Apple tapioca pudding.....	.02
Peach tapioca pudding.....	.06

The old practice of an exclusive milk diet has been abandoned by most authorities, not because it is definitely injurious, but because of personal taste, frequent idiosyncrasies for the protein of milk, and principally because a sufficient caloric value requires the ingestion of three quarts, which undoubtedly tax the kidney in acute glomerular nephritis. The indica-

tion in the acute stage is a supporting food with the least fluid bulk and waste, realizing the minimum of kidney strain.

In safeguarding the functionally impaired kidney and preventing or ameliorating the symptoms resulting from disordered or weakened function, a dietary management based on careful study is of paramount importance.

Nephritis must be recognized in the early chronic stage and the relative functional derangement estimated. The patients will otherwise sooner or later become frankly uremic and in spite of treatment be poisoned to death by the food taken for sustenance. The nephritic kidney lacks the latitude of response of a normal kidney—that is, it cannot respond as economically to an extra call as a normal kidney. We may not be able to demonstrate this fact at an early stage, as the functional tests are about normal, high blood pressure being for a long time the only clinical evidence. But to safeguard the tenure of life in these patients, the lesion must be recognized and understood in the early stages and carefully managed. Management means dietetic management in the main, and consists in restriction of foods which burden the impaired function. We must scrutinize the functional capacity of the organ regularly, avoid impoverishing the blood by a too rigid restriction, and carefully regulate meals and rest periods to best facilitate circulatory and kidney rest. Management on this basis requires study and care, but the reward more than compensates the effort. When we see patients with advanced terminal uremia recovering, on a carefully selected diet, from stupor or semistupor and surviving for months or a year, the reward of careful dietary management over a period of fifteen to twenty years may be appreciated.

The usual outcome of acute glomerular nephritis is recovery with disappearance of the blood from the urine and restoration of normal or nearly normal function. If the pathological change persists in the glomerulus, as it usually does in the form of fibrosis or scar tissue, the blood pressure remains high, or increases in a few weeks, following a drop with the absorption of the exudate. This constitutes early chronic nephritis. At times there is a trace of albumin with casts, and these with hypertension or hypertension alone may be the only evidence of an existing early chronic nephritis. Occasionally nephritis of the chronic type develops insidiously. It may be well here to call attention to work reported by Longcope(8) and his followers.

In a study of the kidney in serum sickness, they found a clinical picture of kidney derangement very closely resembling nephritis of the salt

retention type, due presumably to the effect of protein on the cells of the kidney. These findings and clinical experience point to the probability of food protein cleavage products injuring the kidney in certain instances. Food idiosyncrasies are sufficiently common to suggest that a careful study of the ingested proteins in this type of vague etiology may prove helpful through the elimination of a single food or class of foods.

The management of chronic nephritis is concerned with several factors, regulation of *salt*, *water* and *nitrogen* intake. The first consideration is to meet the functional capacity without strain, but the associated circulatory embarrassment due to the continued high blood pressure is an associated factor which must also be taken into account. Economy in circulatory and kidney work is the result we are striving for.

The excretion of nitrogen in renal disease is a subject which has received considerable attention at the hands of research workers. Kornblum found there was no diminution in the excretion of nitrogen in chronic Bright's disease, but that the metabolism of nitrogen was much retarded. Mann, another observer, concluded that in every case of chronic nephritis, sclerosis and amyloid disease of the kidneys that the income of nitrogen was greater than the outgo, resulting in a small amount of nitrogen retention. Von Noorden came to the conclusion that urea and creatinin was excreted with difficulty in parenchymatous nephritis, but, on the other hand, he found that purin bodies—uric acid, xanthin, hypoxanthin and ammonia are well excreted. The conclusion is that nitrogen equilibrium can only be maintained when a small amount of nitrogen is ingested above the outgo. Some examples of diets, with a comparison of income and outgo of nitrogen, are illustrated in the table on page 334, taken from Tibbles' "Food in Health and Disease."

All patients require a limitation of their *water* intake, the degree of restriction depending on the lag in water excretion. A considerable number of these cases, usually due to relative circulatory decompensation during the working hours of the day, store up considerable quantities of water without manifesting any other signs. They are busy the entire night with a polyuria, and apart from the harmful effect of interrupted sleep, the kidneys are kept at work and the normal rest period of brain and kidney is materially interfered with.

Concerned closely with the water intake problem is the salt problem. Impairment of *salt* elimination is a large part of chronic nephritis, but the added functional injury in stasis of the kidney greatly adds to the already existing functional defect, and a vicious circle is established. The vascular strain is aggravated and failure is apt to follow, for a kidney

THE EXCRETION OF NITROGEN IN RENAL DISEASES

THE KIND OF DISEASE AND DIET	NITROGEN; GRAMS IN			RE-TAINED
	FOOD	URINE	FECES	
<i>Chronic Parenchymatous Nephritis</i>				
1. Milk, 2,400 c.c.; bread, 726 grams; tea...	24.0	17.3	.9	+ 5.8
Milk, 1,000 c.c.; bread, 748 grams; tea...	12.5	7.5	2.3	+ .7
Milk, 1,500 c.c.; bread, 743 grams; tea...	14.9	13.6	1.7	— .4
2. Milk, 2,400 c.c.; bread, 340 grams; tea...	18.2	8.5	1.0	+ 8.7
	18.2	7.6	.7	+ 9.9
Milk, 2,400 c.c.; bread, 760 grams; tea...	26.8	15.6	1.2	+ 10.0
Milk, 1,826 c.c.; bread, 58 grams.....	9.3	8.0	.3	+ 1.0
3. Milk, 1,757 c.c.; bread, bouillon.....	9.0	11.9	2.5	— 5.4
4. Bread, oatmeal, milk and meat.....	14.8	10.7	7.8	— 3.8
5. Bread, meat, oatmeal, milk and jam.....	17.8	10.4	5.7	+ 1.7
<i>Chronic Interstitial Nephritis</i>				
1. Mixed diet	17.0	13.9	1.5	+ 1.6
2. Mixed diet	17.7	9.9	2.9	+ 4.9
3. Milk, 250; meat, 200; bread, 120 grams; five eggs	14.8	13.3	1.3	+ .2
	9.9	8.9	.7	+ .3
	16.7	10.7	1.5	+ 4.5
4. Soup, meat, eggs, bread and vegetables...	15.4	9.6	1.8	+ 4.0
	8.2	7.9	1.2	— .9
	9.9	7.4	1.1	+ 1.4
5. Raw eggs (ten) and water.....	9.9	9.4	.8	— .3
6. Meat, 200; milk, 250; bread, 120 grams..	9.9	8.5	.9	+ .5
	9.9	8.3	1.1	+ .5
<i>Sclerosis of the Kidneys</i>				
1. Milk, 1,500; bread, 100 grams.....	10.7	6.7	.7	+ 3.3
Milk, 1,500; bread, 100 grams; five eggs..	16.7	10.1	.8	+ 5.8
2. Milk, 2,310; bread, 152; beef, 80 grams; butter and vegetables.....	20.9	10.1	2.1	+ 8.7
	17.5	10.8	1.6	+ .5
	17.5	15.4	1.4	+ 5.3
3. Milk, 2,000; bread, 304 grams; six eggs..	17.5	12.6	1.5	+ 3.4
<i>Amyloid Disease of the Kidneys</i>				
1. Milk, 2,000; bread, 290 grams; seven eggs	20.1	10.8	2.1	+ 7.2
2. Milk, 1,000; meat, 150; bread, 150; but- ter, 43 grams; three eggs, etc.....	15.9	10.6	1.7	+ 3.6

whose functioning ability would serve for many years, may be quickly thrown into a condition of absolute decompensation by an added stasis.

In the early stages, *nitrogen* restriction is not a very pressing need except in a few cases, but the functional ability in the kidney for nitrogen elimination should be determined and a diet to fit the need be instituted.

In the main, low protein diet days will usually suffice, with a fairly liberal portion on other days.

Below is the low protein diet in use at Johns Hopkins Hospital:

LOW PROTEIN DIETARY USED AT JOHNS HOPKINS HOSPITAL

Breakfast:

Sherry.....	30 c.c.
Baked apples, stewed prunes, orange.	
Hominy cornstarch cereal (two-thirds hominy, one-third cornstarch).	
Cream.....	15 c.c.

Dinner:

Sherry.....	30 c.c.
Potato, baked or mashed.	
String beans, cabbage, carrots, lettuce, onions, tomatoes, cucumbers, pickles.	
Fruit cornstarch pudding, fruit tapioca pudding.	

Supper:

Cream.....	0.41
Hominy cornstarch cereal.....	.13
Baked apple.....	.04
Orange.....	.16
Stewed prunes.....	.10
Cabbage.....	.16
Carrots.....	.10
Lettuce.....	.24
Onions.....	.17
Cucumber, pickles.....	.10
Baked potato.....	.48
Mashed potato.....	.40
String beans.....	.23
Tomato.....	.23

Desserts:

Blackberry cornstarch.....	.05
Prune cornstarch.....	.07
Apple tapioca.....	.02
Peach tapioca.....	.07

Clinical Types of Chronic Renal Disease.—Clinical types of well-established chronic renal disease may be divided for consideration of management, as pointed out by Janeway(9), into five groups: 1, patients with albumen and casts in the urine as the only evidence of disease; 2, patients with hypertension, with or without casts and albumen and with slight subjective symptoms or none at all; 3, patients with outspoken myocardial insufficiency and hypertension; 4, cases with general edema without notable myocardial insufficiency as the prominent symptom; 5, advanced renal

insufficiency, uremic symptoms superimposed upon one of the foregoing types.

DIET IN CLINICAL TYPES OF CHRONIC RENAL DISEASES.—The *first type* is the one generally referred to in the introductory discussion on early chronic nephritis. Often a rigid restriction is irritating to the patient without being of benefit, but watchfulness over a long period of time is a necessity. Restriction of high purin intake, of condiments, alcohol and great quantities of salt and fluid, without a rigid régime, is indicated.

The *second group* noted includes a considerable number of cases, and requires much study in determining the presence or absence of serious underlying glomerular disease. If the underlying lesion is nephritis, careful restriction of nitrogen intakes is definitely indicated (*see* low protein diet). If the case is one merely of benign sclerosis in which the lesion concerns the small vessels of the kidney while the glomeruli are normal, the management consists in formulating a diet placing the minimum strain on the circulation (*see* circulatory diet). As a general rule, in treatment in the simple benign sclerosis, the following rules are applicable:

Avoid the abuse of fluids; use salt sparingly; avoid bulky foods; avoid alcohol unless, when taken with meals, in a light form it provides relaxation and a sense of well being. If an underlying glomerular lesion exists, careful regulation of the protein intake should be added to the foregoing restrictions. Considerable skill in regulation is necessary to restrict protein without disturbing the patient's appetite, yet adequately meeting the patient's physiological needs in amino bodies. Each case of this type is a study in itself and cannot be dieted by strict rules.

In the *third type* the same problem exists as noted in the foregoing type. The myocardial insufficiency may be added to a glomerular hypertension or to a simple benign hypertension. It needs but a glance to see the need of greater restriction in the glomerular type. Here again the protein feeding problem is one of considerable import. Myocardial insufficiency adds considerable impairment in the salt elimination function, which is often reduced to mere traces. One must keep in mind here that many months elapse after compensation is established before the functional impairment of salt elimination returns to its former concentration.

The *fourth type* is composed of three sub-classes: (*a*) cases in which degeneration of the tubules exists without inflammatory change referred to earlier as degenerative nephritis or nephrosis. In this type the alkali-salt therapy, supplemented by the restriction of acid-forming foods and

the ingestion of base-forming foods, is indicated (*see table*); (b) kidneys of a purely salt retention edema clinically established by the work of Widal(10) and in pure type discussed by W. W. Palmer(11). Restriction of salt is accompanied by rapid disappearance of the edema (refer to diet); (c) the third type is that of chronic diffuse nephritis with a nephrotic element added to the fixed glomerulus. Salt restriction, water restriction and a diet to increase bases and decrease acids is indicated.

The *fifth type* is that of advanced renal insufficiency. Uremic symptoms superimposed upon one of the foregoing types constitute the classical terminal uremia, with nitrogen retained in great amounts in the blood—advanced acidosis and marked salt retention. The discussion of its management will be considered under the special headings.

The following are standard diets poor in salt suitable in cases with impaired salt elimination:

EXAMPLES OF DIETS CONTAINING NOT MORE THAN TWO GRAMS OF SALT

1. Balint(12) prescribed: Milk, $1\frac{1}{2}$ to $2\frac{1}{2}$ pints; butter, $1\frac{1}{2}$ ounces; three eggs; saltless bread, $9\frac{1}{2}$ to $12\frac{1}{2}$ ounces; and weak tea or coffee. Calories, 2,300 to 2,400.
2. Achard and Widal(10) prescribed the following:
 - (a) Potatoes, 35 ounces; meat, $10\frac{1}{2}$ ounces; butter, $1\frac{3}{4}$ ounces; rice, $4\frac{1}{2}$ ounces; proteins, 98 grams. Calories, 2,295.
 - (b) Saltless bread, 7 ounces; meat, 14 ounces; butter, 3 ounces; sugar, $3\frac{1}{2}$ ounces; protein, 117 grams. Calories, 3,037.
 - (c) Saltless bread, 7 ounces; potatoes, $10\frac{1}{2}$ ounces; rice, $3\frac{1}{2}$ ounces; sugar, $3\frac{1}{2}$ ounces; butter, 1 ounce; protein, 33 grams. Calories, 1,891.
 - (d) Milk, 2 pints; two eggs; meat, 10 ounces; flour, 2 ounces; sugar, $1\frac{3}{4}$ ounces; butter, $1\frac{3}{4}$ ounces; protein, 125 grams. Calories, 2,292.

PERCENTAGE SODIUM CHLORID IN FOODS

RAW FOODS	%	COOKED FOODS	%
Unsalted butter.....	.02	Poached eggs.....	.5
Egg yolk.....	.02	Fruit, usually less than.....	.5
Fruit, not more than.....	.06	White bread.....	.48-.07
Vegetables and salads.....	.10	Brown ".....	.75
Cereals and legumes.....	.01-.10	Cauliflower.....	.5-.9
Milk.....	.15-.18	Cabbage.....	.5-.9
Eggs.....	.14	Mashed potato.....	.5-1.0
White of eggs.....	.19	Roast beef.....	1.9-2.3
Salted butter.....	.100	Beef steak.....	3.0
Cheese.....	1.5-2.5	Buttered eggs.....	2.4
Caviar.....	6.7	Omelet.....	2.7
Meat (unsalted).....	.10	Asparagus.....	2.7-3.5

Foods containing 0.5% or less protein	Foods containing 0.5% to 1.0% protein	Foods containing 1% to 1.5% protein	Foods containing more than 2% protein
Arrowroot starch, cornstarch, sugar, honey, cotton- seed oil, almond oil.	Manioc starch, arrowroot, sago, tapioca, apples, pears, plums, rhubarb, toma- toes, turnips, oranges, lemons, raspberries, gooseberries, strawberries.	Grapes, leeks, on- ions, bananas, celery, cabbage, cauliflower, sauerkraut, horseradish, tomato-catsup, butter.	Potatoes, string beans, artichokes, lard, thick creams, fat salt pork, fat ham, bone marrow.

The Gouty Kidney.—Gout is due to the deposition of the salts of uric acid in the joints. Increased concentration of uric acid in the blood is a factor in this deposition, and although differing on minor points, most authorities are agreed that its retention is due to a defect in renal function. Its dietetic management requires an analysis of its source. Simple proteins do not yield uric acid, but the nucleo proteins are rich in it and as food are the source of the exogenous or ingested purins. The endogenous purins are derived from tissue destruction. An important fact to be kept in mind in dietary management is that the secretory, more particularly the digestive organs, are composed of nucleo proteins and that a diet with a minimum of strain on digestion materially reduces the formation of endogenous purins. The indications in a choice of foods is non-purin food of simple structure.

PURIN-FREE DIET IN GOUTY KIDNEY.—A purin-free diet should be used for a short period, particularly to allow an estimate of the endogenous purin. Following this, an elaboration of diet is indicated, the purin-containing food to balance the estimated average of the twenty-four hour uric acid excretion.

The permanent diet should be as liberal as permitted by the eliminative power of the kidney, with the following restrictions and occasional interspersed purin-free days. The intake of sodium chlorid should be limited. Coffee, tea and cocoa should be used very sparingly if at all. Alcohol in any form should be interdicted as it interferes with uric acid elimination by the kidneys. Condiments should be avoided. Strawberries, cucumbers, tomatoes and oranges are interdicted. Water, not alkaline but with a mild saline taste, should be taken freely.

The following table giving purin values should be consulted in arranging a permanent diet for gouty patients (*see Purin Diet*).

QUANTITY OF PURINS IN FOOD

VARIETIES OF FOODS	Purins, Grains per pound	Percentage of purins
Codfish.....	4.07	.058
Plaice.....	5.56	.079
Halibut.....	7.14	.102
Salmon.....	8.15	.116
Tripe.....	4.00	.057
Mutton.....	6.75	.096
Veal (loin).....	8.14	.116
Pork (loin).....	8.49	.121
" (neck).....	3.97	.056
Ham (fat).....	8.08	.115
Beef, ribs.....	7.96	.113
" sirloin.....	9.13	.130
" steak.....	14.45	.206
Liver.....	19.26	.275
Sweetbread.....	70.43	1.006
Chicken.....	9.06	.129
Turkey.....	8.82	.126
Rabbit.....	6.31	.097
Oatmeal.....	3.45	.053
Peameal.....	2.54	.039
Haricot beans.....	4.16	.063
Potatoes.....	.14	.002
Onions.....	.26	.009
Asparagus.....	1.50	.021
Lager beer.....	1.09	.012
Pale ale.....	1.27	.014
Porter.....	1.35	.015

The Stasis Kidney.—The stasis kidney found in myocardial failure uncomplicated by hypertension or nephritis requires the restriction of water and salt. Tendency to relapse, and particularly chronicity in the edema after the cardiac muscle has improved, is very often due to over-use of salt. This one function of salt elimination is materially disturbed in stasis kidneys and often for months following the disappearance of the edema, the function is not fully established.

DIET IN STASIS KIDNEY.—The diet of choice in stasis is that known as the Karell diet or Karell cure. The technic is the following:

The patient receives daily at 8 a. m., 12 m., 4 p. m., 8 p. m., 200 c.c. of raw or boiled milk, warm or cold according to taste. No other food or liquid is given; thirst is often very annoying during the first few hours, but must be endured. After the first week, during which the edema in most instances disappears, a soft boiled egg in the morning and a small piece of toast in the evening may be added. The next day the same food

is allowed and the amount of food may then be slowly increased, care being taken to avoid salt and limit the fluid to the 800 c.c.

The following table taken from Goodman's(13) article will illustrate its efficacy:

TABLE SHOWING DIURESIS AND SODIUM CHLORID OUTPUT AS
AFFECTED BY KARELL TREATMENT
(Wittichs' patient)

Date, 1911	Dietary	NaCl IN GRAMS		
		Urine	Intake	Output
May 28	Salt-free diet without limiting fluid.	700	3.	4.2
" 29	" " " " " "	700	3.	3.5
" 30	Karell cure.....	1400	1.7	10.1
" 31	" "	1300	1.7	9.2
June 1	" "	800	1.7	4.4

Jacobs, Wittichs and others have called attention to the prognostic significance of the pure Karell diet, or the Karell cure used without medication. Wittichs especially regards the prognosis as serious when there is chlorid equilibrium, persistence of edema, and stationary urinary output or diminution of the same. Special importance is attached to the chlorid output, by which the prognosis can be determined on the first day.

A positive chlorid balance is absolutely unfavorable; in his group this was seen in but two cases, who died within the first few days of the cure. Wittichs interprets the chlorid metabolism not only as an index of the extent of the reëstablished compensation, but also of the beginning compensation following a Karell cure. When salt retention begins at the end of the Karell cure, he regards this as an early sign of a fresh decompensation or a pre-edematous stage of cardiac decompensation, and recommends a repetition of the Karell cure in order to spare the heart further fatigue.

Bichlorid Nephritis—DIET IN BICHLORID NEPHRITIS.—Bichlorid or mercury nephritis in the acute stage admits of little direction in dietary management because of difficulty in swallowing. This fact is responsible in some degree for the oliguria. Intravenous infusion to meet this deficiency is a part of the established treatment for the condition, and observers report a material increase in the quantity of urine after its use. Essentially, oliguria or anuria is the determining factor in morbidity with cases of mercury nephritis who survive the first days. Means to combat this anuria and neutralize its effect on the system are called for

in the dietary management. The result of anuria is called the *urinoid* type of uremia. It is not associated with edema, shows no eclamptic phenomena, no prominent acidosis symptoms, no hypertension. It is simply retention of the type produced by extra-renal obstruction. Non-protein nitrogen increase is the result, and intravenous sugar and intrarectal carbohydrates play an important part in the treatment of its acute period. Milk and eggs as an antidote binding the mercury salt, followed by the introduction of considerable quantities of water during the oliguria and sugar infusions during the anuric state, will usually carry the patient through the critical period of bichlorid elimination.

Acidosis.—Although not all the factors concerned in the production of acidosis in many conditions are fully understood, convincing data point to phosphorus retention as greatly if not entirely responsible for it in nephritis. Howland Marriot and others have emphasized its significance and were unable to find it a factor in the acidosis of diabetes and other conditions.

DIET IN INCIPIENT AND ESTABLISHED ACIDOSIS.—The painstaking investigation of the problem by many workers will undoubtedly throw further light on the management of this condition. In the light of available knowledge, a selection of foods directed to furnish bases and increase elimination of phosphoric acid is indicated. For fully established acidosis, a diet rich in calcium and foods of base-forming values with restriction of articles containing phosphorus are called for (*see* other tables, acid and base values in food).

· UREMIA

Three types of uremia, urinoid, eclamptic and terminal, occur. They differ in their etiology and clinical phenomena and require different dietary management. The urinoid type occurs in the anuria of extra-renal causes, or in necrosis of the kidney, and has been considered under mercury nephritis. The eclamptic type usually occurs with acute inflammatory nephritis or during an acute exacerbation of chronic glomerular nephritis and demands the same management. The degree of restriction of nitrogenous foods is dependent upon the degree of oliguria. In addition to tissue edema, brain edema is the predominant factor. Foods with high base forming values are indicated.

Terminal uremia without vascular complication offers insurmountable obstacles to dietary treatment. Its appearance indicates practical or total loss of all kidney functions, except water excretion; it is associated with massive accumulation of nitrogen waste products and concomitant acidosis

APPROXIMATE AMOUNTS OF MAGNESIUM AND CALCIUM OXID
IN FOOD MATERIALS

VEGETABLE FOODS	Ash in per cent substances	Magnesium in per cent of ash	Calcium in per cent of ash
Millet.....	5.1	25.8	...
Cocoa.....	4.9	15.9	2.8
Cornmeal.....	....	14.9	6.3
Rice.....	0.67	13.4	0.8
Nut-kernels.....	....	13.0	8.6
Wheat-flour.....	2.3	10.9	2.2
Buckwheat.....	....	10.3	6.6
Barley.....	2.5	9.6	3.5
Apples.....	0.27	8.7	4.0
Coffee extract.....	3.4	8.6	3.6
Peas.....	2.6	8.1	5.1
Rye flour.....	1.97	7.9	1.02
Oatmeal.....	2.3	7.0	3.0
Tea extract.....	3.1	6.8	1.2
Potatoes.....	5.0	2.5	0.8
Grapes.....	2.25	8.8	36.9
Cherries.....	0.4	5.5	7.5
Plums.....	0.31	4.7	4.9
Asparagus.....	6.4	6.3	15.9
Lemon juice.....	0.2	3.3	7.9
Bananas.....	....	8.8	12.5
Spinach.....	2.03	5.3	13.1
Savory.....	....	2.9	27.9
Cauliflower.....	8.8	Trace	21.7
White cabbage.....	11.6	3.7	12.6
Kohlrabi.....	8.9	3.2	10.2
Radish.....	6.4	3.5	8.8
Cucumbers.....	4.8	3.0	6.9
Gooseberries.....	0.4	5.8	12.2
Lentils.....	2.1	1.9	5.1
Beans.....	3.1	6.5	8.6
Shoten.....	0.7	6.3	7.8
Clover.....	....	4.8	36.1
Poppy seed.....	....	9.5	35.1
Sorrel.....	....	8.3	31.6
Pears.....	0.4	5.2	7.9
Strawberries.....	....	Trace	14.2
Cereals.....	5.4	2.3	5.6
ANIMAL FOODS			
Beef.....	....	15.2	2.9
Albumen of hens' eggs.....	....	13.0	13.0
Woman's milk.....	....	5.0	24.3
Yolk of eggs.....	....	6.0	38.0
Cow's milk.....	....	20.0	151.0

and salt retention in the blood. In this type of kidney disease fluids should be forced. This treatment aids materially in the elimination of nitrogenous waste. Sugar infusions and carbohydrates by mouth delay

waste nitrogen accumulation. Lemonade with 500 grams of sugar to the quart, forced to gastric tolerance, is a commonly used vehicle and will be borne by the patient. Treatment at the most can only postpone the fatal day.

OXALURIA AND INDICANURIA

Traces of oxalates and indican are commonly found in urine and are not abnormal. When they are present constantly in considerable amounts regulation of diet is indicated. Both substances are associated with intestinal auto-intoxication and have the same symptoms.

The reader is referred to the chapter on Intestinal Intoxication for its dietetic management. Rhubarb, tomatoes, pineapples, apples, sorrel, strawberries and lemons should be eaten sparingly or refrained from altogether. The diet should consist of such animal food as eggs, fish, poultry, cereals, stale bread, toast and a minimum of butter. Coffee, carbonic acid water and alcohol should be temporarily forbidden, and Carlsbad salts and dilute mineral acids taken with meals.

PHOSPHATURIA

The diagnosis of phosphaturia should be made only after both qualitative and quantitative analyses have demonstrated the presence of phosphates; otherwise neurotic individuals may be upset by a purely imaginary abnormality.

When a diagnosis has been established the diet should be arranged so that albumin is taken in minimum quantities, carbohydrates making up the deficit in calories. Vegetable albumin and milk may be given.

Reference to the source of phosphates in food value tables, and to the part calcium plays in calcium food values has been made in the treatment of the exogenous and endogenous phosphate abnormalities. The reader will be aided by consulting them. (*See Phosphorus and Calcium Food Value Table.*)

POLYCYSTIC KIDNEYS

A study of the functional capacity of the kidneys with the test diets will yield data from which dietary management may be intelligently directed. The functional impairment resembles that found in chronic glomerular nephritis in varying degree, and no fixed rules are applicable beyond the statement that their management is essentially that of chronic nephritis.

The treatment will be aided by consulting the food tables in reference to nitrogen and salt.

REFERENCES

1. HEDEYER AND SCHLAYER. *Deutsch. Arch. f. klin. Med.*, 1914, cxiv, 120.
2. CHRISTIAN, FROTHINGHAM, O'HARE, WOODS. *Am. J. Med. Sc.*, 1915, cl, 655.
3. JANEWAY. Chronic Renal Disease, *Am. J. Med. Sc.*, Feb., 1915, vol. cli, No. 527.
4. MOSENTHAL, H. O. *Arch. Int. Med.*, 1915, xvi, 733.
5. VOLHARD AND FARR. *Die Brightsche Nierenkrankheit*, 1914, Berlin, Julius Springer.
6. FISCHER, MARTIN. *Edema and Nephritis*, 1915, Wiley.
7. MARRIOT, W. McKIM AND HOWLAND, JOHN. Phosphate Retention as a Factor in the Production of Acidosis in Nephritis, *Arch. Int. Med.*, Nov., 1916, vol. xviii, No. 5.
8. LONGCOPE, WARFIELD. *Am. J. Med. Sc.*, Nov., 1916, vol. xlii, No. 536.
9. JANEWAY, THEODORE C. Management of Patients with Chronic Renal Disease, *Am. J. Med. Sc.*, Feb., 1916, vol. cli, No. 527.
10. ACHARD AND WIDAL. *Ibid.*
11. PALMER, W. W. Studies in Paroxysmal Edemas, *Arch. Int. Med.*, Feb., 1915, vol. xv, No. 2.
12. BALINT. *La Cure de Déchloruration*, 1906, J. J. Ballière.
13. GOODMAN, EDWARD HARRIS. The Use of the "Karell Cure" in the Treatment of Cardiac Renal and Hepatic Dropsys, *Arch. Int. Med.*, June 1, 1916, vol. xvii, No. 6.

CHAPTER X

DIET IN DISEASES OF THE SKIN

S. J. NILSON, M.D.

General Considerations.

Various Classes of Foods and Their Food Values: Protein; Fats; Carbohydrates; Mineral Matter.

Food Requirements of the Body.

Digestibility of Foods: Factors Influencing Digestibility of Foods.

Diseases of the Skin: Acne; Eczema—Infantile Eczema; Furunculosis and Carbuncles; Pruritis; Psoriasis; Rosacea; Seborrhea and Eczema Seborrhoicum; Syphilis and Cutaneous Tuberculosis; Urticaria and Erythema Toxicum; Xanthoma Diabeticorum.

GENERAL CONSIDERATIONS

The dietetic treatment of skin disease from the scientific standpoint has hitherto received comparatively little study. Theoretic reasons and practical experience render it probable that the majority of skin diseases are not directly influenced by diet. Dietetic treatment is absolutely essential in some diseases, however, such as urticaria, toxic erythema, etc.; in other conditions, such as acne, psoriasis, certain forms of eczema, etc., the diet is important either by direct or indirect influence. In still another class of skin diseases, dietetic treatment is of value only by improving the general condition of the patient. In considering the subject of diet in diseases of the skin and its appendages, we are handicapped in treating many of these conditions by our imperfect knowledge of their etiology.

Before discussing some of the more important diseases of the skin in which dietetic measures are of value, it seems advisable to consider, in the first place, various classes of food and their fuel value, selecting those that are suitable to the disease in question. After this, the assimilation of foods will be considered as influenced by functional or organic changes in various organs, including those of internal secretion; finally, altered

conditions of the integumentary system. The reader is referred to Volume I, Chapters V and VI, for a thorough understanding of the physiology and chemistry, and the fate of the foodstuffs in the processes of digestion.

VARIOUS CLASSES OF FOODS AND THEIR FOOD VALUES

Protein.—Protein is one of the most important products in metabolism, and has been a source of great difference of opinion among various investigators at different times. We know that protein is essential in constructive metabolism or anabolism; in childhood or youth relatively more protein is required, the amount constantly decreasing until old age is reached, when perhaps only one-third as much is needed as in early life. In infancy and childhood, metabolism is extremely rapid in the construction of the various tissues until full growth of the organism is reached, after which time protein is only necessary for body repairs. Later, in old age, destruction of tissues takes place in such a way that the body as a whole diminishes in weight.

This process must be constantly kept in mind in order to understand and intelligently apply the principles of diet in dermatology. We require a certain amount of protein to maintain a nitrogenous equilibrium. This is the point where the intake of a sufficient and regular amount of protein leads to a condition in which the nitrogen excreted equals the nitrogen in the food. This varies from day to day.

When less nitrogen is eliminated than is ingested, there is a storing up of substances producing a positive nitrogen balance. This is seen in infancy, in childhood, and in convalescence after fever where proteins have been destroyed. Negative balance on the other hand, occurs when more nitrogen is excreted than is ingested, as observed in wasting disease, inanition and malnutrition. The quantity of protein necessary for bodily needs depends upon numerous factors.¹

Fats.—Fats are derived from both plants and animals, where they exist chiefly as triglycerides of stearic, oleic and palmitic acids. In addition, there are various oils and also lecithin and cholesterin which are of importance in the metabolism of nervous tissue.

Butter forms a very valuable article of diet, as it is easily digested and fairly rapidly absorbed. Cream and milk are free fats that form a perfect emulsion consisting of very fine globules of fat, making them readily available for absorption into the blood. When these substances

¹ Discussed at length in Volume II, Chapter VII.

are taken in fairly large quantities together with other foods, slowing the process of digestion, the fat may undergo fermentation in the intestinal tract, giving rise to very irritating acids. Again, not being oxidized as rapidly as carbohydrates, it may be rapidly absorbed and then deposited in the adipose tissue. Finally, it may be excreted through the sebaceous glands, giving rise to inflammatory conditions of the skin.

Carbohydrates. — Carbohydrates form the principal constituent of plants, such as vegetables, nuts, fruits and grains and are also present in small amounts in milk, fish, meat, etc. They are found in a great number of compounds, such as starch, sugars, gums and cellulose.¹

Fruit sugars constitute another group which must be considered. The acids of ripe fruits are very valuable, either in the natural state or when added as flavors to the food. At times certain fruit acids produce sensitive conditions in the skin and mucous membranes which may be due to an idiosyncrasy. This is particularly true for unripe fruit which more readily ferments. Certain fruits such as berries, especially strawberries, are apt to produce cutaneous manifestations. Lactose or animal sugar is highly antiputrefactive, then follow glucose and galactose, respectively. When glucose alone is ingested, it is not readily absorbed. Large quantities reach the cecum before absorption has taken place, whereas other sugars, such as sucrose, which splits up partly into glucose, is absorbed long before it reaches the cecum. All these facts are of importance in considering carbohydrate digestion and its reaction upon the excretory organs of which the skin is one of the most important.

Mineral Matter.—Mineral matter exists in the body in various elements, as calcium, magnesium, sodium, potassium, chlorine, sulphur, phosphorus, iron, manganese, iodine, etc. These exist to a small extent as organic compounds, but chiefly as salts, including phosphates, chlorides, carbonates, sulphates, oxides, etc. They are not oxidized in the body and furnish no heat and energy, but are absolutely essential for various chemical purposes and vital for tissue building.

The source of minerals is derived from the various foods. Fruits and vegetables supply a great number; the citrous fruits, particularly oranges and lemons, being very valuable in this connection. They must be ripe, however, as otherwise the immature salts are apt to interfere with digestion and metabolism.

A number of persons, especially members of the laity, are still inclined to believe that these citrous fruits produce an acid condition of

¹ For a full discussion see Volume I, Chapters III and XIII.

the blood. This view has been proven to be false. These fruits contain the salts of sodium and potassium citrate, etc. They are organic salts, the organic radical oxidizing to form CO_2 and H_2O , the sodium and potassium being liberated to form sodium and potassium bicarbonates. This is absorbed and increases the alkalinity of the blood, forming a very valuable aid in the treatment of skin diseases.¹

FOOD REQUIREMENTS OF THE BODY

The amount of food needed by the body depends upon:

1. The energy to be expended by
 - (a) Striped muscle.
 - (b) Smooth muscle.
 - (c) Glandular activity.
 - (d) Metabolism of cells.
2. The bulk of the individual.
3. Temperature of the medium in which the subject lives.
4. Temperature of the body.

The needs of the individual bear a direct relationship to the size of his body. Larger individuals require more food than smaller ones, though a fat individual requires relatively less food than the lean person. This subject has been discussed at length in another section of this work to which the reader is referred.²

DIGESTIBILITY OF FOODS

All foods taken into the body are not completely oxidized, the portion that is not utilized appearing in the excreta. The difference between the food that is oxidized in the body and that which is unoxidized and found in the excreta is termed the "coefficient of digestibility." This is influenced, as we shall see, by various factors as follows:

Factors Influencing the Digestibility of Foods.—One of these is the condition of the digestive tract, if congested or in any way pathologically changed. Pathological alterations in the mucous membrane of the stomach or intestine will modify the secretions so as to interfere with the digestion of food products.

¹ For a full discussion of the mineral constituent of foods, see Volume I, Chapter XI; and Volume II, Chapter X.

² See Volume II, Chapter IX.

Hypo- or hyperchlorhydria and achylia gastrica are conditions which will interfere. Digestion is similarly affected by pathological changes in the accessory digestive organs, such as the liver and pancreas. Hepatic cirrhosis, chronic passive congestion of the liver, and pancreatitis are conditions giving rise to changes. Altered conditions of the heart and arteries will interfere with the absorption from both portal system and thoracic duct. An abnormal liver becomes the seat of perverted chemical processes and is easily stored with products of digestion in excess, such as glycogen. When the organ is thus rendered unable to care for more sugar, in form of glucose or even incompletely digested disaccharids, these substances are absorbed directly into the blood and short-circuited to the skin and its appendages, producing various forms of irritations. Other foods may be short-circuited in a similar manner and thus cause disturbances, such as acne, rosacea, toxic erythema, etc.

The organs of excretion, as the sweat glands, lungs, large intestine and the kidneys must also be considered. Absorption of putrefactive products from the large intestine as indican, etc., in quantities may be sufficient to disturb other organs. Organic change of one form or another in the kidney is of extreme importance, whether it be retention of fluids, salts, as sodium chlorid, or excretory products of protein, such as ammonia, uric acid, urea, or creatinin. We can readily see how this would influence assimilation of food into the system. I fear we do not consider this sufficiently in considering diet, whether it be general or special.

The pancreas and other glands of internal secretion have an intimate influence upon these processes. In diabetes or in hyperglycemia carbohydrate assimilation is impaired. We can comprehend how the "coëfficient of digestibility" must vary according to conditions as they arise.

Improper, too bountiful or too meager dietaries are operative factors in many skin disorders. Spoilt food is also a causative factor; in many cases the bad condition of the food has not been suspected. Salt water foods, oysters, clams, crabs, lobsters, fish, pork and foods apt to undergo rapid change and deterioration, occasionally provoke urticaria, etc., in individuals who usually can ingest these articles with impunity.

Idiosyncrasy often has a bearing on the appearance of skin lesions, such as urticaria from the ingestion of strawberries. Many of the opinions so firmly held by the laity and also by some members of the profession regarding the harmfulness of certain foods in diseases of the skin, are hardly based upon a sufficient foundation of facts.

Food or condiments difficult to digest, or too stimulating, such as cheese, rich pastries, pork meats, veal, spices, mustard, pickles, the

excessive use of tea or coffee, should be tabooed when prescribing a dietary in disease of the integumentary system. They are beyond doubt of possible etiologic import in some, and probably in many cases. Moreover, indigestion predisposes to the development of gastric and intestinal toxins.

DISEASES OF THE SKIN

Acne—DIET IN ACNE.—Acne is influenced by diet to a great extent. Indiscretions in diet cannot be said to be the exciting cause, but undoubtedly render the skin more susceptible to infection. Sebeogic foods affect this condition as in seborrhea (*see* discussion of seborrhea, page 358). Sweets, candies and sugars are best omitted or considerably restricted. An excellent diet consists of milk, bread in moderation, crackers, butter, vegetables and fruits, meat in moderation, broiled or roasted. Under no condition should fried food or pastry (unless thoroughly baked and crisp) be allowed. Stews, hashes and meats cooked a second time are to be avoided. Raw fruits, except citrous fruits, readily cause fermentation, but stewed fruits are entirely suitable.

Patients afflicted with acne often swallow their food whole and should be admonished to eat slowly and thoroughly masticate their food. Alcohol should be forbidden, coffee as well, with the possible exception of one cup of coffee in the morning. Weak tea, not steeped over three minutes, is allowed.

Milk and cream should not be taken with meals, but preferably an hour before meals. Fermented milk is excellent if no idiosyncrasy exists. It makes a suitable meal with crackers. In place of fermented milk Bulgarian bacillus may be taken for ten days during the month. Do not allow the patient to overeat, as is so generally the case. The intestinal tract should be constantly kept in good condition. Advise the use of hot or warm water before breakfast. In cases of atonia, a mixture of nux vomica with rhubarb and soda mixture is often advisable.

Eczema.—Eczema comprises about one-third of all skin diseases for which medical aid is sought. It has been a stumbling block to many clinicians, general practitioners as well as dermatologists, and up to the present time we have been at sea as to what to do in many cases of this disease.

DIET IN ECZEMA.—In the past, some writers, among them George Henry Fox, have taught that a low protein diet is most suitable for patients suffering from eczema. Others on the contrary have advocated an exclusive meat diet. By various other writers the cause of the disease

has been referred to ingestion of butter and other fats, oatmeal, fish, etc. Among recent writers, Chipman has called attention to the importance of a more intimate knowledge of body metabolism.

While the majority of cases of eczema will respond to dietetic treatment, there are others in which such treatment seems of little avail, except to improve the patient's general condition.

VARIETIES OF ECZEMA AMENABLE TO DIETETIC TREATMENT.—

In a general way, it seems to me from clinical observation, that there are three classes of eczema amenable to dietetic treatment, namely:

1. Eczema occurring in individuals who have retention of uric acid or of nitrogenous excretory products as urea, ammonia and creatinin.
2. When food anaphylaxis is present.
3. Eczema of infants and young children.

DIET IN ECZEMA DUE TO URIC ACID RETENTION.—Uric acid retention is of frequent occurrence in eczema and is often seen in apparently healthy, robust adults. These individuals usually have a gouty diathesis and uric acid retention. Eczema of this type may be localized, consisting perhaps of a papulovesicular eruption of the hands, or it may be a generalized condition. In case of failure to cure this with local treatment, dietetic measures should be employed.

The diet in this type should be essentially one that is purin-free and of low protein content. Food rich in nuclei, hence in purin, such as pancreas, thymus, liver and kidney, should be excluded. Malt liquors, tea, coffee and chocolate contain purin, while on the other hand, green vegetables, milk and eggs are purin-free.

The patient should be put on a diet of buttermilk, soda biscuits, milk crackers or toast, and orange or lemon juice from the ripe fruit, for three days or longer, according to the severity of the case, as governed by the rapidity of the disappearance of the lesions. Use two quarts of buttermilk, eight milk crackers or four slices of toast, three or four oranges or lemons. This will yield from 1,200 to 1,400 calories. Alternate buttermilk with the fruit juice at intervals suitable for the individual patient. In addition, give an alkaline salt, as one to two drams or more of bicarbonate of soda per day, taken in fruit juice or in plain water.

If, for any reason, buttermilk cannot be taken, sweet milk may be substituted in about half the quantity of buttermilk, as the caloric value is about double that of buttermilk. You may add to the sweet milk either barley water or lime water. Gradually, well cooked cereals or two or three slices of bacon, later soft-boiled eggs, stewed fruits and vegetables, as spinach, celery, etc., are added to the diet. Later, potatoes, butter and

meats are allowed, keeping constantly in mind the need of stopping at a point at which a relapse occurs. Meat may be restricted to a certain number of days a week.

In the case of *nitrogen retention*, it is well to obtain an accurate knowledge of the condition of the kidney function. This can be done by careful examination of a twenty-four-hour specimen of urine or by examination of the blood, estimating urea nitrogen, uric acid and creatinin, or by the various functional tests, as that by phenolphthalein, or by test meal.

DIET OF NEPHRITIC PATIENTS IN ECZEMA.—In eczema occurring in connection with acute nephritis, the treatment consists of the usual measures for the relief of this condition, including the Karrell or other suitable diet. The type with which we have to deal is usually the more chronic one in which retention is present. Our aim is to give a low protein diet if anaphylaxis can be ruled out, first giving sufficient fluid to free the system of the nitrogenous excretory products. This is best given in the form of water with orange juice or an alkaline salt, such as a combination of potassium citrate, acetate and bicarbonate, 30 grains each, 3 times a day. After this we can give the rice diet consisting of rice, boiled in water and well dried out, eaten with butter and dry bread, three times a day. It should be thoroughly masticated and incorporated with saliva. The rice diet is continued from three to five days or longer, then giving milk and gradually adding other foods as outlined above.

DIET IN ECZEMA FROM FOOD ANAPHYLAXIS.—The second class of eczema involves a careful investigation as to the underlying cause inasmuch as we have to deal with a *food anaphylaxis*. This is a condition of unusual sensitiveness or an exaggerated susceptibility to foreign protein, as shown by White, Strickler and others.

The offending food substances, which in all probability are proteins, must be ascertained. It is always desirable to obtain the history of eruption occurring in childhood, as this often gives a clue to work upon. If sensitiveness is present, it is most often due to two or more proteins. The common ones are milk, egg albumin, wheat, buckwheat or some other grain, or shell fish. Less common are meats, as pork, veal or mutton, and tomatoes.

There are two ways in which to identify the offending substance: (a) the diet test; (b) the endermic or cutaneous test. In the first method, the patient is put on a mild diet which we know will not cause any disturbance, gradually adding the above mentioned foods one at a time until a reaction is obtained. This food is then eliminated from the diet and

other articles of food are similarly tested. This process takes a long time and requires careful observation both by the patient and physician.

The second method consists of endermic injections of a definite dilution of foreign proteins. A positive reaction consists in the development of (*a*) an erythema; (*b*) a papule; (*c*) tenderness. Reaction is shown by a lesion usually $1\frac{1}{2}$ to 2 cm. in diameter, lasting 48 hours. This method requires a careful technique, because unless properly carried out, it is extremely dangerous and has proven fatal in a number of cases.

The safest method of performing the skin test, is to remove the superficial epithelium in two parallel rows on the forearm, denuding four areas in each row with a dental burr without drawing blood, the second row being used as a control. A definite dilution of the various proteins is prepared and applied to the denuded areas of one row. A positive reaction is indicated by an erythema and a wheal from $\frac{1}{3}$ to $1\frac{1}{2}$ or 2 cm. in diameter, appearing within 15 to 20 minutes. This method is fairly satisfactory.

The offending foreign protein having been discovered, it is eliminated from the diet, or fed in small increasing quantities until anti-anaphylaxis is produced. This condition is not an immunity and may be lost unless the protein in question is continued.

It is also well to control the carbohydrate and fat digestion, and to maintain a proper function of the large intestine. In acute cases more care is required than in the chronic ones. It is best to exclude food which is difficult to digest, such as pastry, foods fried in grease, and fat soups. Coffee and tea should be limited to one cup in the morning.

Infantile Eczema—DIET IN INFANTILE ECZEMA.—Eczema in early life presents a different problem from that occurring in later years, because of the difference in the digestion and assimilation of food, especially of fats and sugars. This changes by degrees from infancy to childhood, when the question of protein digestion also becomes a factor. In the first three months of life infants have very little if any power to digest starch. This begins to develop about the third month. Cane sugar is not well digested until after the sixth month, and so on with various other food products. The power to digest proteins except that which is found in milk, develops gradually. Fat beyond a certain quantity cannot be digested.

Infantile eczema, in some instances, is due to local causes such as infection about the face and mouth, or irritation of the buttocks and inguinal regions by soiled napkins, excreta, etc. Other types are almost invariably due to dietetic indiscretion. In infants, particularly during

the first year, the fats are chiefly at fault, then carbohydrates, later on proteins as well.

The ideal fat is that of mother's milk. It is more finely divided, *i.e.*, the emulsion is more perfect than in cow's milk. There is less volatile fatty acid in woman's milk, casein is lower, and the amount of lactalbumin greater. It contains less calcium phosphate and a higher percentage of potassium carbonate and iron. Woman's milk is markedly influenced by external factors. Improper food taken by the mother and maternal digestive disorders affect the child, and the same is true if the mother does not take sufficient physical exercise or if she gives way to her emotions. Cow's milk is also modified by similar conditions, and milk from a mixed herd is the most desirable for artificial feeding.

Cases of infantile eczema in which local treatment fails, are usually amenable to diet. In breast fed infants, greater difficulties are encountered due to the fact that it is hard to dilute mother's milk. In the treatment of such cases it is necessary to examine the mother's milk and try to remedy conditions mentioned above. The trouble is nearly always traced to a milk too rich in fats and sometimes carbohydrates. We must proceed as follows: Before feeding, the baby can be given barley water, lime water or lactose water, then allowed to feed to make up the usual quantity. Another method is to express milk by means of a breast pump and then dilute according to the formula which will be given later. It is well to give one or two bottles in place of breast, morning and afternoon, formula according to age and condition. This accustoms the baby to artificial food and facilitates weaning.

Holt has said that "any substitute for mother's milk is a poor substitute." This is true and under certain conditions it is necessary to obtain a wet nurse. In disturbances of diet, artificial feeding is more easily controlled and on the whole more satisfactory than breast feeding, provided the right dilutions are used. We can use 7 per cent milk or plain skimmed milk. The point is to secure the right percentage of fat.

Age	Intervals	Amount	No. of oz. in 20 oz. mixture of 7% milk	Per cent Fat
1 to 2 weeks	2 hours	2 ounces	3 in 20 oz.	1
4 "	2 "	3 "	5 " 20 "	1½
3 months	3 "	5 "	8 " 20 "	2
6 "	4 "	6 "	9 " 20 "	3
9-12 "	4 "	9 "	Whole milk	4

The foregoing scheme is figured on the 7 per cent basis, which may be obtained by taking the upper half of the bottle of milk which has been left standing over night. The dilution is made by adding barley water and one ounce of lime water to a 20 per cent mixture. If sugar is needed, lactose is added.

We can usually obtain evidence of the form of disturbance by examination of the stools or by the occurrence of vomiting. (Fat in stools of breast fed infants is composed of from 20 to 30 per cent in dried residue. Fat from cow's milk is present in 40 to 50 per cent in dried residue.) A microscopical examination of the stool will give satisfactory evidence. A stool containing white soft curds, or a slate colored stool which is sticky and pasty, is due to fat. A green stool foul in odor is due to carbohydrate. This subject has recently been studied by Towle and Talbot, bringing out many valuable points. C. J. White has claimed that a moist eczema is due to fat and a dry eczema is due to starch. If vomiting occurs soon after feeding, it is usually due to fats. It is important to start low and increase gradually. If the schedule calls for one per cent fat, start feeding at one-half per cent.

Carbohydrates in infants are all absorbed by the time they reach the cecum. The amount of lactose oxidized *per kilo weight* is 2.1 gram. With increase to 3. and 3.5 gram, sugar appears in the urine, the same being true of cane sugar. In the case of maltose, no sugar appears in the urine until 7. to 7.5 gram are given. It can be said that maltose oxidizes in greater quantities than any other sugar. Maltose may therefore be added to the diet of children. Starches are very well taken care of after the seventh month, so that cereals in the form of gruels can be started at this time. The juice from ripe oranges may also be given.

FOOD ANAPHYLAXIS IN INFANTILE ECZEMA.—In reference to *food anaphylaxis*, tests have proven very unsatisfactory in young children. Infants do not react well to cutaneous tests of protein, which are found to be of no value. Even when no reaction occurs, the ingestion of proteins may produce trouble.

Substances from which we may expect anaphylaxis in infants and children are chiefly butter, fats, milk, cane sugar, eggs, and at times orange juice. It is better to obtain evidence of trouble by feeding until the cause is discovered and can be eliminated from the diet. Sometimes the trouble lies with the mother. Cow's milk taken by the mother may cause disturbances in the baby, which disappear when it is stopped.

Disturbances of this nature may be expected at the end of the first year, continuing for one or two years longer, this being the period when

the child becomes accustomed to the various foods. By the end of the first year, a child should have whole milk (in eczema it is often better to prepare milk dishes, using skimmed milk for all feeding purposes) gruel, beef juice, white of egg and sweet oranges. Salts of fruits are very beneficial to children. Transitions to solid food should be gradual. Potato may be given, but not raw fruits. We also may give pineapple juice, grape juice, orange juice, or cooked and strained fruits. Fruit juice should be given once a day, preferably two hours after feeding. Beef juice or beef broth or white of one or two eggs is also allowed. After the first year, stop straining cereals, give bread and toast, scraped piece of beef, steak or chop, amounting to about a quarter of an ounce.

ROUTINE DIET FOR NORMAL CHILD.—The following is a routine for a diet for a normal, healthy child and can be varied to suit conditions in eczema: In the early morning, one glass of warm milk. Two hours later, orange juice. 10.30 A.M., cereal well cooked, not strained; milk, zwieback, toast may be added—the total to make 10 ounces. 1.30 P.M., beef (scraped), dram 1, or one whole egg and one-half a potato, a tablespoonful of rice, a little cooked fruit, apple sauce, strained; no milk. 6 o'clock, same as breakfast—milk, cereal, bread and butter. 10 o'clock, warm milk. Keep up with milk. The above routine is good for two years.

Furunculosis and Carbuncles—**DIET IN FURUNCULOSIS AND CARBUNCLES.**—Diet appears to have some influence in lessening the resistance of the skin to the invasion of the infectious microorganisms. When furuncles and carbuncles are numerous and extensive, particularly when vaccines and other methods of treatment do not give satisfaction, diet should be tried.

In the presence of hyperglycemia or diabetes, infections such as furunculosis will find a suitable soil for development, as recently shown by Schwartz and Heimann. Pilosebaceous infection is also influenced by sabagoues and other foods as in acne. The same articles of food suggested for the dietetic treatment of acne accordingly constitute a suitable diet for these conditions.

Pruritus.—This disease is often produced by local conditions, but may be caused by general systemic or nervous diseases or morbid processes in the body. Constipation and the subsequent chain of symptoms following absorption are probably the most important.

DIET IN PRURITUS.—In instructing the patient as to diet, it is of importance to exclude alcohol, tea and coffee. He should also be advised to give up tobacco. Regulate the bowels by enemas and other suitable means. Lay down rigid laws for diet, endeavoring to eliminate articles

of food which are known at times to produce itching, such as eggs, fish, cheese, and strawberries. A rice or milk diet may be given first trial, or a mixed diet of well-cooked plain food consisting of vegetables, greens and fruits and some of the lighter meats may be advised.

Psoriasis.—Up to the present time, no conclusive proof has been presented that the disease is due to any specific microörganism. On the other hand the researches of Schamberg seem to indicate that protein foods are either directly or indirectly an important, if not the sole cause of this disease. The presence of excessive amounts of amino-acids (the end products of protein digestion) in all probability stimulates the production of the psoriatic lesions.

Future investigation must show where the proteien metabolism is at fault, whether it be the mere excess of protein taken into the system, or whether it be faulty assimilation. Possibly the liver does not functionate properly and fails to oxidize the ammonium compounds such as ammonium carbonate and ammonium carbamate into urea. This appears to be a more probable cause than the retention of nitrogenous waste products. As the study of the blood permits an investigation of the various nitrogenous waste products, we may hope for further valuable elucidation on this point.

DIET IN PSORIASIS.—Psoriasis is favorably affected by a low protein diet, but as in eczema, not all types of psoriasis are amenable to treatment. This disease responds best to dietetic treatment when it is acute in onset and profuse in amount. When the attack is on the decline, particularly where few lesions are present, diet is less successful and better results are obtained by local treatment. Expressed in a few words, the diet should consist chiefly of vegetables and fruits, cereals in moderation with milk and cream, but no meats or fish. To obtain the best results, we should not allow more than 5 grams of nitrogen per day. If more is ingested, evidence of the fact may be obtained by an examination of the urine. If over 3.5 to 4 grams are excreted, the intake of nitrogen must have been over 5 grams.

In choosing a diet for psoriasis, the following foods have been found to give the best results: Beets, lettuce, sweet potato, lima beans, cabbage, cauliflower, celery, turnips, also bread, corn meal, grape nuts, corn starch, grapefruit, grapes and oranges. The most suitable vegetable is that which contains the least protein. Peas, beans and lentils are fairly rich in protein, so that they should not be included when a vegetarian diet is recommended. The diet should be continued until the eruption is well on the decline. This may require one or more months. We may then add

cereals, finally meats, such as chicken once or twice a week and other meat within the limit of tolerance.

The following dietary for psoriasis, suggested by Schamberg, will be found useful:

Vegetables—Beets, lettuce, cauliflower, string beans, celery, turnips, sweet potato, spinach, carrots, watercress, parsnips, cucumbers, Brussels sprouts, radishes, mushrooms, asparagus, cold slaw, tomatoes, squash, cabbage, pumpkins, onions, egg plant.

Fruits—Apples, apricots, cherries, cranberries, huckleberries, lemons, canteloupe, oranges, plums, strawberries, watermelon, pineapple, figs, dates, prunes.

Syrups—Maple, sugar, molasses. Also butter and corn starch.

Other foods allowed in moderation—Peas, macaroni, spaghetti, noodles, white potato, cakes and pies, rice pudding, bread and fat bacon.

Cereals—Corn flakes, Pettijohn's, rice, force, cream of wheat, shredded wheat, puffed rice, hominy, wheatena, corn cakes, griddle cakes, waffles.

Soups—Potato, celery, corn, lentil, vegetable.

Drinks—Weak tea, weak coffee, weak chocolate.

FOODS TO BE ENTIRELY AVOIDED.—Meats, fish, fowl, eggs, cheese, nuts, oysters, crabs, lobsters, clams, soups made with meat; all internal organs.

Rosacea.—Rosacea is a reflex condition affecting the capillaries of the nose and face as well as other parts. It is undoubtedly most often caused by ingestion of alcohol, generally over periods of years. Ordinarily alcohol can be ingested for a long time without causing rosacea. The mucous membrane of the stomach finally becomes congested, thereby interfering with the absorption of alcohol, which then remains in the stomach for a longer period, causing fermentation and sometimes reflex irritation.

DIET IN ROSACEA.—Although alcohol is probably the most frequent causative factor (we all recall the "tooper's nose"), other substances will produce the same condition, such as hot soup or drinks, like tea or coffee, or very cold food or drink, and highly seasoned food. These substances should therefore be avoided. It is also advisable not to overload the stomach. Soups should be discontinued for a while and pork, fat fish and shell fish should be avoided. The patient should drink sparingly of water during meals. Plainly cooked, wholesome and easily digested food is the best.

Seborrhea and Eczema Seborrhoicum.—Seborrhea is a condition where the pilosebaceous follicles are abnormally large and secrete a sebum

changed in character. Eczema seborrhoicum is characterized in addition by a hyperkeratosis with a grayish discoloration and an excessively oily skin.

DIET IN SEBORRHEA.—In considering foods and their assimilation, we have already referred to their influence in this condition as shown by D. W. Montgomery. We alluded to a short-circuiting of easily absorbed fats and carbohydrates. Diet in seborrhea can be adapted accordingly. In the first place, restrict easily assimilated fats, particularly when ingested with other foods. Avoid eating butter, milk or oil with meals unless this food constitutes the entire meal, in which case they are less likely to cause trouble. Fried foods, fatty meats and fat soups should be avoided. Easily converted carbohydrates are absorbed and transformed into fat and subsequently deposited in the subcutaneous fat and secreted through the sebaceous glands. In this disease these glands secrete a fat changed in character from that normally secreted.

Sucrose or cane sugar is rapidly converted and absorbed and is therefore quite sebagogic in nature. Certain fruit sugars and alcohol are decidedly so. The diet should consist of plain well cooked foods, with carbohydrates in moderation. Green vegetables are very serviceable, as are also acid fruits. Cream and milk should be taken sparingly with meals. Only a small quantity or no water at all may be taken with meals, but the patient should drink water plentifully between meals. Candy and sweets, as ice cream or soda, are not permitted between meals.

Sugars that are not absorbed produce a sluggish condition of the bowels, favoring intestinal fermentation, which is often present in seborrhoic conditions and must be remedied as well. A low caloric diet with sufficient exercise to oxidize any possible excess will be of great service.

Syphilis and Cutaneous Tuberculosis.—These diseases, although not particularly amenable to dietetic treatment, cannot be passed by without comment.

DIET IN SYPHILIS.—In syphilis, one particular food ordinarily looked upon as a beverage really does a great deal of harm, namely alcohol. In order to obtain the best results, it should be excluded entirely.

Syphilis in the acute stage is really a toxic disease, producing changes in nearly every organ of the body, including those of assimilation and excretion. We therefore choose foods which are fairly easily absorbed and which will give sufficient nourishment to the body without taxing the organs of excretions to the limit.

DIET IN TUBERCULOSIS.—Tuberculous processes are notably affected by alcohol and here also it should be excluded. A tuberculous individual

should be given a diet of sufficiently high caloric value to insure about 10 pounds additional weight. Raw eggs and milk given between meals accomplish this object. It is also of importance not to overtax the alimentary canal, as these patients often have difficulty in assimilating their food.

Urticaria and Erythema Toxicum.—Acute types of this disease in many, if not in all, instances are due to some form of anaphylaxis. A few cases are undoubtedly due to drugs. The chronic types are probably not caused by anaphylaxis, but are the result of some digestive disturbance, constipation with intestinal putrefaction, or intestinal parasites.

The specific food reactions have thrown much light upon this subject and have proved of considerable value in the acute types. This is unfortunately not true of the chronic types where such reactions are unreliable and of little, if any, value.

There can be no doubt as to the existence of food anaphylaxis which in many instances may be inherited. In a considerable percentage of inherited cases, reactions have been found to be due to eggs, cereals and pork. In the acquired cases, the sensitizing agent has been frequently discovered in cheese, tomatoes, strawberries, less frequently other food. These foods, of course, do not always produce an urticaria. When, however, the system is rendered more susceptible by gastro-intestinal fermentation, or faulty assimilation, or incomplete oxidation of the proteins, urticaria is liable to follow their ingestion. Diseases produced by the ingestion of partially decomposed foods, or foods containing ptomaines, etc., undoubtedly influence the system to react in a similar way.

In the chronic type of urticaria, anaphylaxis seems to play only a small part. It is more probably caused by absorption of putrefactive products from the intestinal tract, as seen frequently in constipation or where large quantities of unoxidized carbohydrates remain in the large intestine. In this manner fuel is added to the fire by continuing a morbid bacterio-chemical activity.

DIET IN ACUTE URTICARIA.—Diet in the acute type is plainly indicated by the specific skin reaction, by means of which the offending foreign protein can be eliminated. The foods most commonly at fault have already been mentioned. Upon inquiry, a possible history of heredity will somewhat simplify the treatment. An eruption due to foods that have undergone putrefaction will clear up under a diet of freshly prepared food.

DIET IN CHRONIC URTICARIA.—In the chronic type, the diet should be chosen so as to lessen intestinal fermentation. The treatment may be

begun with irrigations of the large intestine during a few days. Give plenty of green vegetables which will leave sufficient residue to stimulate peristalsis. Forbid raw fruits, with the exception of citrous fruits, and use sucrose-containing foods in moderation.

What has been said regarding the cause of urticaria is essentially true in regard to the so-called toxic erythemas. McBride and Schorer, however, found that fish, tomatoes and cheese produced urticaria, whereas cereals and pork were more likely to produce erythema.

DIET IN TOXIC ERYTHEMA.—Dieting should be preceded by high enemas or laxatives. Put the patient on fluids for a few days, such as clear broth with crackers, and juice of citrous fruits. Later add rice, milk toast, vegetables, and finally meats. In case of anaphylaxis or if the condition still persists after the above procedure, endeavor to find the offending protein and remove it from the diet.

Xanthoma Diabeticorum—**DIET IN XANTHOMA DIABETICORUM.**—Inasmuch as this disease is due to diabetes or hyperglycemia, it is useless to enter into a detailed description of diet. It is sufficient to say that a diabetic diet should be instituted.

BIBLIOGRAPHY

- ATWATER and BRYANT. The Chemical Composition of American Food Material, U. S. Dept. of Agric., Washington, 1906.
- BRUGSCH, T. Dietetic innerer Erkrankungen zum praktischen Gebrauche für Ärzte und Studierende, Berlin, pub. by J. Springer, 1911.
- CANON, W. B. The Mechanical Factors of Digestion, London, 1911.
- CHIPMAN, E. D. Dermatological Dietetics, J. Am. Med. Assn., 1916, lxvii, 1646.
- CHITTENDEN, R. H. Physiological Economy in Nutrition, An Experimental Study, New York, 1904.
- . The Nutrition of Man, New York, 1907.
- COMB, A. Intestinal Auto-intoxication, New York, 1910.
- DIEUDONNE, A. Bacterial Food Poisoning. So-called Ptomaine Poisoning, New York, 1909.
- EINHORN, M. Practical Problems of Diet and Nutrition, New York, 1905.
- FLETCHER, H. The New Glutton or Epicure, New York, 1909, 4th ed.
- . A. B. C. of Our Own Nutrition, New York, 1910, 4th ed.
- FOX, G. H. Diet as a Therapeutic Measure in Diseases of the Skin, J. Cutan. Dis., 1907, xxv, p. 152.

- JORDAN, W. H. Principles of Human Nutrition. A Study in Practical Dietetics, New York, 1912.
- KERLEY, C. G. Eczema in Infants and Young Children, New York State J. Med., 1916, xvi, p. 523.
- LANGWORTHY, C. F. Green Vegetables and Their Uses in Diet, Year-book Dept. of Agric., 1911.
- LUSK, G. The Elements of the Science of Nutrition, Philadelphia, 1909.
- MCBRIDE, W. L., and SCHORER, C. H. Erythematous Urticarial Eruptions Resulting from Sensitization to Certain Foods, J. Cutan. Dis., 1916, xxxiv, p. 70.
- MONTGOMERY, D. W. The Relation of Diet to Seborrhea, J. Cutan. Dis., 1916, xxxiv, p. 829.
- ROBERTS, SIR W. Lectures on Dietetics and Dyspepsia, London, 1886, 2nd ed.
- SCHAMBERG, J. F., KOLMER, J. A., RINGER, A. I., and RAIZISS, G. W. Research Studies in Psoriasis, J. Cutan. Dis., 1914, xxxi, pp. 698, 802.
- SCHWARTZ, H. J., and HEIMANN, W. J. Sugar Content of the Blood in Various Diseases of the Skin, J. Cutan. Dis., 1916, xxxiv, p. 159.
- STELWAGON, H. W. Diet as an Etiological Factor in Diseases of the Skin, J. Cutan. Dis., 1907, xxv, p. 147.
- STRICKLER, A., and GOLDBERG, J. M. Anaphylactic Food Reactions in Dermatology, Preliminary Report, J. Am. Med. Assn., 1916, lxvi, p. 249.
- TOWLE, H. P., and TALBOT, F. B. Infantile Eczema and Indigestion, Am. J. Dis. Child., 1912, x, p. 219.
- WALLACE, J. The Rôle of Modern Dietetics in the Causation of Disease, London, 1912.
- WHITE, C. J. The Anaphylactic Phenomenon in Eczema and the Recent Progress in Our Knowledge of the Etiology and Treatment of the Disease, J. Cutan. Dis., 1916, xxxiv, p. 57.

CHAPTER XI

DIET IN INFECTIOUS DISEASES

SECTION I

LEGRAND KERR, M.D., F.A.C.P.

General Considerations: Dietary Considerations; Hygienic Considerations; Symptoms of Gastro-Enteric Disturbance.

Acute Infectious Diseases: Chicken Pox; Cerebrospinal Fever; Diphtheria; Measles; R  theln; Scarlet Fever; Small Pox; Whooping Cough; Poliomyelitis.

GENERAL CONSIDERATIONS

In a study of the diet in the (acute) infectious diseases considered in this section, it is necessary to touch upon some general considerations which apply to all. This will avoid repetition and make for brevity, but in aiming at conciseness, we do not mean to convey that these generalities can be considered as apart from the special dietetic care of infectious diseases in general. These considerations are just as much a part of the management as though they were placed in full before the specific directions for each disease.

As the foundation necessary for the building up of an adequate special dietary, we will first consider the influence of various factors upon the ability to take sufficient food.

Dietary Considerations—ORDER AND FREQUENCY OF THE MEALS.—The patient stricken with an acute infectious disease suffers from a diminution in the desire for food, a diminution in the capacity to perfectly digest it, and a changed relationship toward his accustomed food. The food must therefore be such as is easily digested and taken in smaller quantities at more frequent intervals, as much variety to be instituted as is possible. In disease associated with enfeebled digestion, it is the common practice to insist upon several hours elapse, (six) between the meals.

This practice cannot be followed in the presence of acute infectious disease. The demands upon the whole economy are so great that in spite of enfeebled digestion the nourishment must be adequate, and usually adequacy means a much more liberal diet than is customary.

Woods and Merrill(1) claim that the giving of two or more food materials at one meal puts less strain upon the digestive system than the giving of one alone. This is certainly borne out clinically and it is our common observation that a mixed diet will support the same person much longer and better than the single food diet, even though the changes during the twenty-four hours are many.

VARIETY AT MEALS.—Variety in the dietary in acute infections is necessary, because there must be a continued appeal against the natural aversion to food at this time. It is not merely a matter of estimating calories or a nice balancing of what ought to be the actual food need of the patient of a given weight and age. This can well be dispensed with in acute disease; it is a problem of giving an adequate diet that the patient will accept and, if possible, take willingly. Accordingly, variety must be instituted not only because it is appealing, but because the mixed dietary is more easily digested and assimilated. Appetite is many times strongly influenced by the sight and smell of food. This may be taken advantage of in the sick-room, not as a routine, but as an occasional stimulant to the desire for food.

INFLUENCE OF EMOTION.—The influence of emotion upon the desire for food and the ability to properly digest it, is not always considered. In the sick-room régime, the sometimes unavoidable excitement of the patient should be the reason for the occasional breaking of the arbitrary meal hours. Food taken at or shortly after periods of special stress, is apt to cause unnecessary and unpleasant digestive disturbances which influence the course of the disease.

This is particularly true in children, who should not be fed soon after the visit of the physician, the administration of any treatment that is disquieting (lavage, throat swabbing, etc.) or the arousing of the emotions (especially of fear, anger, grief, etc.) which are incidental to all sick-room régime.

FOOD IDIOSYNCRASIES.—Food idiosyncrasies are frequently met with since their production is better understood, and the patient with an acute infection must be protected against the distress that may result in a given case. Although many so-called idiosyncrasies are wholly or in part imaginary, or have been so fostered by the patient or friends as to become a part of the mental equipment, enough real instances exist to command

our attention in the planning of the meals. The commonest manifestation is the production of a rash (usually urticarial) although vomiting, gastric pain, diarrhea and general weakness may be added, singly or in combination.

INDIVIDUAL TENDENCIES.—Individual tendencies must also be considered. It is always necessary in planning an adequate dietary in the acute infections to have some idea of the normal standard of the particular patient. Unless this is done, we may overfeed or undernourish. It is sometimes impossible to determine this normal standard, as it depends on habit and circumstances, but in most instances a practical working standard can be obtained.

After having considered the general factors which influence the desire for food, we come to a consideration of the dietary in acute infectious disease. On this point there will always be divergence of opinion. Theory and preconceived notion or the experience gained from one or more isolated cases are apt to interfere with the application of broad general principles.

Often the anxiety to reduce the real or imagined strain which is placed upon the stomach results in acute malnutrition; or the heart is enfeebled because a régime is instituted which has as its sole object the lessening of the work of the kidneys.

Acute disease requires a special dietary, but in securing this, we should consider the patient's general condition, and keep two rules in mind: First, consider the patient's previous condition and habits; will the suggested dietary agree and will it be acceptable? Second, do not forbid the use of any article without a definite reason for so doing. Too often, restriction is arbitrary, unnecessary and not based upon sound reasoning.

The idea that the liberal administration of food raises the temperature in the presence of fever is erroneous. It is a repeatedly demonstrated fact that the lighter articles of diet at least are as perfectly digested in the presence of hyperpyrexia as in conditions with normal temperature. Theoretically, a large proportion of protein would be indicated in fevers, but practically their administration is impossible, so that the best that can be accomplished is to use the means of conserving the protein. There are chiefly two foods that will conserve this protein waste: fats and carbohydrates. Fats are refused quite consistently by most patients with fever, therefore the carbohydrates seem to practically meet the situation, as protein spacers.

EXCESSIVE THIRST.—Excessive thirst is one of the symptoms that demands immediate and continued relief in the acute infections. A child will not always indicate its needs in this regard, so that it is necessary to outline specific directions, otherwise too much or too little fluid may be given. The usual fault is restriction through inattention.

Fluid is required not only for the thirst, but as a diluent to aid in the elimination of the waste-products which are augmented in acute fevers.

Plain water is the best of all fluids, but when not well tolerated, carbonated water (in which the gas has been allowed to escape by standing), may be used. Flavoring with fruit juices (pineapple, lemon, orange, grape), adds to the efficiency of water as well as to the variety. Acidulation with hydrochloric or phosphoric acid seems to stimulate the digestive processes, and is gratifying to the patient.

The various cereal waters given plain or with milk are particularly serviceable, combining as they do—nourishment and fluid.

Milk as the ideal food should be added whenever practical, and in combination it can be varied so that it does not become distasteful.

If an insufficient quantity of milk is taken, it may be fortified by the addition of cream (which is not always relished) or a carbohydrate, such as sugar of milk. The value of sugar of milk in these conditions has not been fully realized or its use would be more extensive.

Peptonization should not be attempted unless directly indicated. Sometimes milk combined with one of the various proprietary infant and invalid foods adds to the variety.

We do not advocate egg-albumin water in the presence of fever and a diminished digestive capacity. Nothing seems to putrefy so rapidly in the intestine as egg-albumin. It is the common practice to use it as a routine, but it is capable of doing much harm. We are convinced that in innumerable instances it has been the cause of much and often serious digestive disturbance, and in the presence of high temperature its use can be well dispensed with.

Strained vegetable broths or purées are also valuable.

The value of meat extractives and of meat broths is greatly overestimated. We must not forget that in giving them we do not give nourishment (their caloric value is quite insignificant), but a stimulant to the gastric juice. In other words, they are not foods, but prepare the system for the reception of food. Although the gastric juice is increased in quantity by their ingestion, there is no influence upon the secretion of pepsin. Therefore, their only place in the dietary is as appetizers, not

as food. This means that they must be administered warm and in very small quantities.

ALCOHOL IN INFECTIOUS DISEASES.—When alcohol is given in acute infectious diseases, it is best to dilute it with glycerin and water. In practically all these diseases, the mucous membranes of the mouth and pharynx are sensitive and dilution as suggested, lessens the irritation that might otherwise result.

Hygienic Considerations—CARE OF THE MOUTH.—In conditions involving the mouth or pharynx, a nursing infant should be taken from the mother's breast, because of the danger of infection of the nipple. The breast milk may be withdrawn and fed by spoon or bottle.

In most of the acute infections, the continuance of a liquid diet after the first twenty-four hours is not usually indicated. It is a clinical fact that early liberal feeding does much to limit the effects of the infectious process. This will be taken up more definitely in the discussion of each disease.

The care of the mouth is highly important. It is easy to see how a diseased condition of the mouth or pharynx may immediately interfere with the ingestion of nourishment or result in its serious reduction, the patient taking only enough to assuage the intenser pangs of hunger. The condition of the mouth thus becomes a vital consideration in the question of diet in infectious disease.

Young children will object strenuously to the usual methods of cleansing the mouth (swabbing, sponging, rinsing), irrespective of the solution used. No matter how efficiently the work is done, it must be repeated frequently (every hour or less) to even approach adequacy. The struggles of the child usually result in a discontinuance of this treatment to avoid exhaustion.

Have we no method then that will adequately cleanse the mouth without repeated rebellion on the part of the patient? Yes, there is a simple and reliable way. The use of chewing gum(2) at regular stated intervals is most efficient. The patient is allowed to chew a piece of gum for three to five minutes every two or three hours and the discarded gum is then destroyed, a fresh piece being used each time. The action is twofold; there is a mechanical removal of offending materials by the action of the tongue in chewing and most of this is gathered into the gum, and there is a decided increase in the flow of saliva which is stimulated by the chewing process. We know of no more efficient, pleasant and lasting method of mouth cleansing than the judicious, regular use of gum. The best time to cleanse the mouth is after each feeding, unless the intervals

between meals are very short. In those conditions in which the patient is semi-conscious and the cleansing of the mouth is very difficult, the placing of a few drops of a solution of lemon juice and glycerin (equal parts) within the mouth is sufficient to cause more or less decided chewing motions (reflexly) and helps to keep this part clean.

Symptoms of Gastro-Enteric Disturbance—DIET IN GASTRO-ENTERIC DISTURBANCES.—The symptoms of gastro-enteric disturbance are marked enough at all times to give a clue to the digestive capacity. Vomitus consisting of a watery fluid either with or without curd, or frothy fermentation or with an unpleasant sour odor indicates the necessity for a reduction of food to rest the disturbed organs in addition to whatever other individual or mechanical means are instituted.

A reduction in the amount of food will not necessarily aid in stopping the vomiting. In fact, the reverse is often true, so that the giving of a much more concentrated food in smaller quantities but at lessened intervals results in almost immediate cessation of the vomiting. This is especially true when diluted milk is taken. The addition of citrate of soda to the milk (in the proportion of one or two grains to the ounce of milk) makes it more acceptable to the stomach.

Stools that become more watery in consistency, changing in color, frothy in character or offensive in odor, indicate impending intestinal disturbance and the reduction in the food must be supplemented by adequate removal of the offending material in the intestine.

Unless exhaustion is serious, the mere withholding of all food for from four to eight hours commonly results in prolonged relief without necessity for any other change.

LIQUID DIET.—Liquid diet as used in this section consists of, water—plain, carbonated, acidulated, or flavored with one of the various fruit juices; cereal water—either oatmeal, barley or rice; milk—raw, peptonized, or modified in any one of the various ways suggested to make it palatable; fruit juices, albumin water, meat extractives, whey, meat broths, coffee and tea.

A semi-solid diet includes liquid diet plus cereal gruels, purées, gelatin jellies, cereals, eggs, toast—dry or milk, Zwieback, crackers, junket, puddings (plain), custard, cornstarch, rice, sago, tapioca, baked potato.

ACUTE INFECTIOUS DISEASES

Chicken Pox or Varicella—DIET IN CHICKEN POX.—There is no special dietary in chicken pox or varicella. Usually the patient can take the

ordinary articles of diet as is his custom, and the only restriction is that made necessary by the reduction in his usual activities. Hence, a slight reduction is generally made in the quantity of food but no change in its variety.

In those rare instances of unusual severity that are sometimes encountered, a semi-solid diet is necessary for forty-eight or seventy-two hours.

Convalescence from chicken pox is usually followed by a marked loss of appetite, which is accompanied by a real distaste for food. This "secondary anorexia" may persist for months. Growth and development show variations. It is a matter sometimes of serious import and is considered more fully under the section on measles, to which the reader is referred.

This "secondary anorexia" does not seem to be influenced in any manner by the severity of the exanthem. Its occurrence is so common after chicken pox and measles that in dealing with the causes of persistent anorexia in children, we always ask about the recent occurrence of acute infectious disease.

Cerebrospinal Fever—DIET IN CEREBROSPINAL FEVER.—Under average conditions the feeding in cerebrospinal fever does not offer any difficulty, because it is governed by the same rules as obtain in all acute infections. But the very nature of the disease often renders the problem of feeding one of great difficulty.

The difficulty in swallowing may make it necessary to give frequent (every ten or fifteen minutes) small (one or more teaspoonfuls) quantities of a predigested food. If there is difficulty in giving this with a spoon, which is often the case, it may be administered with a medicine dropper. But whenever swallowing is possible, semi-solid food is best retained and should be given.

Another difficulty sometimes encountered in feeding a patient suffering from cerebrospinal fever, is the frequent vomiting, often mechanical and due to the extreme retraction of the head. The vomiting is often of nervous origin, and between the attacks the patient may take a practically normal diet, particularly if there be much emaciation. The mechanical difficulty in swallowing may be overcome by the use of the nasal tube. Liberal feeding, whenever possible, should be the rule.

If the demand for food becomes urgent while at the same time there is sufficient interference with the muscles of deglutition to make swallowing impossible, the use of the stomach tube may be advisable. This has to be very carefully considered, because its use so commonly excites convulsions. Then we are forced to resort to the doubtful expedient of

nutrient enemata. Convalescence calls for the administration of an abundance of food limited only by the digestive capacity of the individual.

Diphtheria.—The extremely depressing character of this infection, and the great exhaustion which it entails, would appear to emphasize the necessity for a liberal allowance of food. However, it is well to remember that forced feeding may easily induce vomiting, and in no disease is vomiting to be regarded as more dangerous, owing to the strain it is liable to put upon the heart.

DIET IN DIPHTHERIA.—The diet in diphtheria, then, must be considered from two viewpoints; (a) aside from general considerations applicable to all acute infections, the local process calls for a consideration of special diet and special administration; (b) in no other infection is the judicious administration of an adequate diet apparently so successful as in this disease. We are convinced from clinical experience, that the best preventive of paralysis following diphtheria is a diet fully adequate to the demands placed upon the system early in the disease.

A nursing infant should not be allowed to suckle the mother, because of the great danger of infecting the breast. The milk must be withdrawn and the infant fed by spoon or bottle. We cannot agree with those who claim that immunization of the mother renders this method of feeding unnecessary. It is not merely infection by the Klebs-Loeffler bacillus that we are guarding against, but probable infection from the necessarily unclean condition of the mouth in this disease.

The diet in the acute stage, which usually lasts only for a few days, should consist entirely of fluids. After complete defervescence, should the throat remain swollen, milk is by far the best and most convenient food. It must be given in liberal quantities, and at regular intervals, and with due precaution, and may be supplemented with a bit of chicken breast. If the temperature remains high, one or two poached eggs per day may be allowed in addition, also calves' foot jelly, and other similar preparations. It must always be remembered not to overload the stomach, which might bring on dangerous complications.

In cases with unfavorable symptoms, no matter whether the temperature is elevated, normal or subnormal, the simpler the dietary the better, and if the slightest signs of gastric irritability appear, the milk is preferably peptonized. If the severity of the disease suggests toxic poisoning, and the character of the pulse suggests a failing heart, the question of arousing the patient every two hours for nourishment must be seriously considered. In such cases it is advisable to give nourishment every few hours. Fortunately at this stage in the great majority of cases the

patient is drowsy and not much disturbed by being aroused for food. The presence of albuminuria need not materially modify the dietary.

It is our experience that semi-solid foods are more easily taken than liquids, and as this enlarges the possibilities of the diet, they should be employed. If the patient's nutrition is not maintained he may succumb to the effects of the toxins.

DIET IN INTUBATION.—If intubation has been done, there is commonly some difficulty in swallowing the first few times that food is taken. This is because the fear of the child under the new conditions brings about more or less coughing and struggling. This, however, is quickly overcome by patient persistence (but not compulsion) in the administration of food, until the muscles can adjust themselves to the changed conditions. The difficulty of closing the epiglottis, which is sometimes persistent in neurotic children, causes some of the food to be drawn into the larynx, and produces more or less violent coughing. Unless the obstruction is promptly removed, dyspnea supervenes. The dietetic indications are the same with as without the tube, except that the method of administration is different. The presence of the tube need not deprive the child of the urgently needed nourishment.

In rare instances, although we have never seen a case in which swallowing was impossible, resort to the stomach tube might be necessary, or the use of nutrient enemata, as the most reasonable procedure to start with.

DIET AFTER TRACHEOTOMY.—Tracheotomy does not require any special modification in the dietary.

POSTDIPHTHERITIC PARALYSIS adds much to the difficulty of feeding. Not uncommonly, a large portion of the food is returned through the nose, adding to the discomfort and fears of the child. If there is an involvement of the musculature of the tongue and soft palate, swallowing may become impossible and feeding by gavage is necessary. Patients with even slight degrees of palatal palsy should never be allowed to feed themselves, because they cannot, as a rule, be trusted to take sufficiently small quantities at a time, and should have their nourishment administered in teaspoonful doses by a nurse. Soft solids are often swallowed with less difficulty than fluid foods, and egg custards, rice puddings and fruit jellies are usually readily taken.

Should severe forms of paralysis supervene, affecting the pharyngeal muscles, as a late complication, nasal feeding must be used. In such patients there is a twofold danger; or the child may choke while attempt-

ing to swallow, or particles of food are liable to reach the lungs and bring about a septic pneumonia.

DIET IN CONVALESCENCE.—The dietary regimen must be outlined with due care, until the throat is free from all signs of membrane. In most cases, it is safe to allow an increase of food when the temperature reaches normal, even if small specks of membrane are visible in the throat. Soft solids may first be given, such as milk puddings, egg custards, oat-flour porridge, and corn meal mush, etc., served with cream and sugar. Apple sauce stimulates the child's appetite and may be safely allowed, as may orange juice, or other fruit juices in season. Meat and vegetable soups may now replace beef tea and weak broths. Eggs may also be added to the dietary, either lightly boiled, poached, or served in clear consommé. A few days later, white fish may be allowed. The dietary might be outlined somewhat as follows:

CONVALESCING DIETARY AFTER DIPHTHERIA

Early Breakfast—7.30 A.M.

Orange juice; porridge and milk.

Breakfast—9.30 A.M.

Tea or coffee, cream and sugar; bread or toast and butter and an egg.

Lunch—11 A.M.

Glass of milk and cracker.

Dinner—1.30 P.M.

Plate good soup; fish and potatoes; milk pudding; stewed prunes.

Tea—4 P.M.

Cup of tea; bread; butter and jam; if desired, a poached or boiled egg.

Supper—7 P.M.

One glass of milk; bread and milk stew; oat-flour porridge.

NOTE.—If the patient is able to digest and assimilate this diet, after a day or two, chicken or rabbit or a cutlet may be added to the dinner.

Measles—Morbilli-Rubeola.—There is no disease in which the desire for food is so markedly influenced as in measles. There are two distinct periods during which the variation of the appetite manifests itself. The first is during the stage of eruption, the second after convalescence has proceeded for some time.

DIET IN MEASLES.—During the stage of eruption, the desire for food is markedly diminished or entirely lost, and the child will suffer from the need of nourishment unless it is forced upon him. This involves the most judicious planning for the administration of easily administered concentrated nourishment. Water should be allowed in liberal quantities with the addition of orange and lemon juice to make it more inviting. The

most serviceable food is milk varied as suggested in scarlet fever. With the subsidence of the exanthem, there is usually a rapid insistent return of the desire for food, and if unchecked there is danger from digestive disturbances due to overfeeding. The return to a full dietary may be immediate, but the amounts should be restricted until the digestive system has had an opportunity to adjust itself to almost complete withdrawal of food during three or four days.

The dietary during convalescence with a normal temperature, should consist of eggs, farinaceous food, milk puddings and similar foods. A few days later, the diet may be augmented by the addition of white fish, baked white potatoes, and stewed fruit in moderation. No restrictions are required in the dietary of a robust adult in this stage of the disease. In planning the dietary of young children, on the other hand, some caution is needed in making additions to the list, for fear of inciting an attack of diarrhea, an undesirable complication at any period of measles, and especially intractable in convalescence.

Ker(3) reports what he describes as an ugly outbreak of dysentery in a group of children who were allowed thick vegetable soup, while other children in the same ward, who were on a more rigid dietary, all escaped. Strong meat and vegetable soups, therefore, should be tabooed. Orange juice is allowed, but grapes and fresh vegetables are harmful. Chicken broth with rice, a little white fish and mashed white potato are permissible, along with milk puddings, jelly, bread and butter.

DIET IN SECONDARY ANOREXIA.—After convalescence is well established, there very commonly occurs a loss of appetite which persists for months. There is not alone a lack of desire for food, but a distaste for it. This is so frequent after convalescence from measles and from chicken pox, that its occurrence should always excite an inquiry into the recent existence of these diseases. This anorexia is associated with the occurrence of variations in growth and development. Whether the loss of appetite is responsible for the arrested growth or the variation in the growth is responsible for the lessened demand for food, we do not know, and it makes little difference for practical purposes.

It is incumbent upon the physician, however, to follow up all cases of measles and observe whether or not this "secondary anorexia" occurs. It is important not alone from the standpoint of growth and development, but from the further consideration of tuberculosis. It is our common observation that many cases of tuberculosis in children occur in those who are predisposed several weeks after an attack of either pertussis or measles.

That the "secondary anorexia" plays an important part in the production or furtherance of those conditions which favor the development of tuberculosis, we have little doubt.

Under these conditions, the diet should be forced at more frequent intervals and should be above that which might be considered otherwise sufficient. In addition to the regular three meals a day, for a time, there may be added:

First thing upon awakening—glass of milk or cup of broth.

Mid-morning meal—glass of milk.

Mid-afternoon meal—milk with crackers or sponge cake.

Bed-time—hot milk.

Milk if given at other times is given toward the end of the meal.

Rötheln or Rubecola.—There is no special dietary for rötheln. The disease is mild, the children run about as a rule and require no change in the dietary. Occasionally the glandular enlargement interferes for a short period with comfortable deglutition, so that liquids are the only foods taken with ease.

Scarlet Fever.—DIET IN SCARLET FEVER.—There is a wide difference of opinion as to the influence of diet during scarlet fever upon the occurrence of nephritis. Personally, we are of the opinion that it has little or no influence in preventing the onset of this complication. But clinical experience teaches that there is safety in the usual restriction of the diet to milk during the acute stage of the disease, and milk and the farinaceous diet early in convalescence. While such a diet probably does not prevent, it leaves us in a better position to combat early nephritis, and therefore has its advantages.

Without the fear of kidney complications in the course of convalescence, there would be little to say respecting diet in scarlet fever, and even as it is, many hold to the view that this fever may be dieted along the same lines as any other acute infection. In the acute stage, which rarely lasts longer than one week in the simple form of the disease, the patient should subsist upon a fluid dietary. After the first twenty-four hours and the appearance of the rash, milk is as a rule quite sufficient. As the temperature subsides, the amount may be gradually increased.

A prolonged milk diet soon becomes distasteful, so that it must be varied early and often. The addition of a carbonated water or lime water is desirable, or kumiss or buttermilk may be substituted.

Dilution with different cereal waters accomplishes the same object. The addition of rice flour (one teaspoonful to each four or six ounces) to warm milk, thickens it sufficiently so that it is readily taken by spoon,

and the change is marked enough to be appealing to the appetite. Partial or complete peptonization may also be tried. We have used extensively and successfully, vegetable purées and cream soups. (For directions for making purées, etc., consult Volume II, Chapter XVII.)

For the incessant thirst which is usually present, plain or carbonated water and cereal waters are desirable in small quantities, frequently administered. Fruit juices, diluted with water, are valuable, and are particularly acceptable to children if bicarbonate of soda is added in small amount (quarter teaspoonful to three ounces) immediately before drinking.

Angina is commonly relieved by freely giving cracked ice flavored with lemon or orange juice. In many instances, we have used glycerin in place of the fruit juice flavoring.

The continuance of the exclusive milk diet for two or possibly three weeks may be necessary in severe cases.

The continuance of the milk and farinaceous diet will have to be determined by the condition of the kidneys as indicated by urinalysis and the symptomatology of disturbed kidney function. Children do not stand starvation well, and when we are reasonably certain (as in this disease) that the diet does not prevent the development of nephritis but merely places us in a better position to combat it if it occurs as a complication, we are justified in shortening convalescence by a judicious increase in the diet, during the earlier periods of the disease.

As soon as convalescence is established, there may be a rapid addition of such articles of diet as milk toast, zwieback, custard, junket, sago, tapioca, rice, cornstarch, and baked or broiled fish (excluding mackerel, salmon, herring, smelt, cod and tile fish), until the danger from nephritis is sufficiently eliminated to allow a return to a full diet.

CONVALESCENT DIETARY SUITABLE IN SCARLET FEVER

Breakfast:

Orange or baked apple; oatmeal porridge with cream and sugar; soft-boiled egg; bread and butter; tea.

Lunch:

Rice pudding; stewed prunes and milk.

Dinner:

Soup, white fish or white meat of fowl; egg custard; baked white potato; dry toast and glass of milk.

Tea:

Dry crisp toast; jam; butter; cup of tea.

Supper:

Milk and porridge; slice of bread with butter; orange juice.

Meat extractives and broths have no place in the early dietetic management of this disease.

Small Pox—DIET IN SMALL POX.—The diet in variola need not differ from that recommended in other acute fevers, except that the supporting elements must be used early to minimize the inevitable drain of extensive suppuration.

During the first stage of the disease, thirst is more or less intense, but the desire for food is markedly reduced. It is, therefore, wise to offer milk, albumin water and the carbonated water or lemonade. The various broths are satisfying, but not nutritious, and their use should be restricted in favor of milk.

With the subsidence of the initial temperature, the use of a light nutritious diet must be insisted upon. If the child is old enough, milk, chops, steak, roast beef, eggs, the more easily digested vegetables (as potatoes, peas, lima beans, celery, asparagus tips) can be used.

With the onset of the second period of fever, some reduction in the diet should be made, but this reduction must be suited to the digestive capacity of the individual, and cannot safely be as restricted as during the initial rise of temperature.

Dysphagia, which is commonly marked at this period, demands that the diet is planned so as to be taken in small quantities at short intervals (two or three hours) and given cold. Rectal feeding is rarely necessary or advisable.

If alcohol is used, it is not advisable to combine it with milk or egg, as is so commonly done, because this adds to the discomfort due to the condition of the mouth. Alcohol is best used as recommended under "General considerations."

During convalescence, the diet should be rapidly increased, always allowing, however, for digestive capacity.

Whooping Cough—DIET IN WHOOPING COUGH.—Diet and the bowels require close and constant attention during the continuance of whooping cough. Any latent tendency toward digestive disturbances, more particularly of the intestinal tract, is almost certain to be aggravated by this disease. There is a two-edged sword in pertussis because the paroxysms disturb the digestive tract and any disturbance of the digestive tract increases the number and the severity of the paroxysms. To force food upon such patients usually results in their acquiring an unpleasant habit of deliberately rejecting from the stomach whatever is given. The risk of the expulsion of the stomach contents is not the only thing to fear. We

must not lose sight of the fact that gastric irritation, whether from overloading the stomach or from unsuitable food, will induce paroxysms of coughing. The stage of the paroxysm is, moreover, often so prolonged and so apt to exhaust the patient, that it is highly desirable to supply a liberal amount of easily digested nourishing food to prevent wasting.

The tendency toward vomiting is so constant in this disease, that with the diagnosis should be instituted a scheme of feeding small quantities at frequent intervals. If the vomiting is frequent, the meals should be planned, so as to follow immediately the act of vomiting. It is often claimed that the taking of food or even of medicine will excite vomiting, but in regard to the former, we are convinced that it is not the food but the manner or time of taking that excites the act. When the diet is restricted, the child is eager for the meal, and the common fault is to eat hastily. We have repeatedly seen a meal given too hot or too cold (especially the former) excite vomiting. Improperly prepared meals hastily taken are the commonest cause of vomiting. The interval between the paroxysms should be observed so that in planning the meals they may be arranged after and not preceding the expected attack.

Abdominal distention always increases the paroxysms so that it is essential as part of the dietetic care, that this be avoided through restriction of easily fermenting articles and through efficient peristalsis which, after all, is the best intestinal antiseptic.

In those instances in which the vomiting is very frequent or seems for the time uncontrollable or threatens to interfere seriously with the nutrition, the child should be kept in bed in a quiet room. Even two or three days of this enforced reduction of activity will limit or prevent what might otherwise prove to be serious.

While we cannot share the opinion of those who claim that the diet has a specific influence upon the course of the disease, and that the so-called "tonic diet" (beef twice every day with generous portions of all other foods and wine four times daily) will effect a cure in two weeks, we are convinced that the act of vomiting is too often the excuse for a serious restriction of the dietary. The dangers from the early development of broncho-pneumonia in young children and the later development of tuberculosis in older children in this disease, should make us study the vomiting not as an isolated act, but one associated with other factors, such as the kind of food taken, its temperature, the influence of excitement, exhaustion (mental or physical) the emotions, etc., and having these in mind, the diet should be adjusted accordingly. It is a serious matter to attempt the starvation of the child ill with whooping cough.

Acute Poliomyelitis—DIET IN ACUTE POLIOMYELITIS.—In this disease, the early dietetic treatment involves the withholding of all except liquid food for the first forty-eight hours. Vomiting is present in many of the cases, and is usually so persistent that there is considerable danger in giving anything but liquids. If the paralysis involves the respiratory muscles, even in a mild degree, the absolute liquid diet should be continued over a period of several days. Toward the end of the acute stage, the dietary may be enlarged to include semi-solids, which are readily taken. Convalescence is hindered by unnecessary restriction of the diet, and early liberal feeding should be instituted. It is only during the first few days, and sometimes this stage is reduced to hours, that the child suffers from an acute infection. Later on, the economy needs all the nutrition that it can assimilate, and it is therefore practical to return, as soon as the temperature reaches normal or nearly so, to the child's normal diet, with whatever additions are possible to increase the general nutrition.

In those instances in which the paralysis is the first indication of the disease, there is no need for any change in the child's dietary, with the possible exception that it be regulated so as to include the most nutritious and eliminate the unnecessary articles of diet. In this disease the aim during the many weeks of convalescence should be to eliminate the unnecessary and increase the more nutritious foods.

REFERENCES

1. WOODS and MERRILL. U. S. Dept. Agric., Rep. Bull. 85.
2. KERR, LE GRAND. Am. Med., N. Y., 1911, No. 6, p. 145.
3. KER, CLAUD B. Sutherland's System of Dietetics.

SECTION II

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General Considerations.

Acute Infectious Diseases (*continued*): Foot and Mouth Disease; Plague; Yellow Fever; Cholera; Relapsing Fevers; Sleeping Sickness.

GENERAL CONSIDERATIONS

With particular reference to the dietetic management of the diseases which are included in this section, the question of diet in some of these

infections is of subsidiary importance, while in others it may be the dominant factor in the treatment of the case. This will depend, of course, upon the clinical and pathological features of the disease as well as upon the results of experience in the management of such cases. In many of its domains, medicine is still more of an art than a science, and experience, even if it appears inconsistent with what the features of the case seem to demand, should be given much weight in the determination of the diet.

The question of food is exceedingly important in the management of all infectious, febrile diseases. The increased metabolism and consequent tissue waste force the question of diet into the foreground. Except in one or two of this class of diseases we have no specific remedies and hence we must treat symptomatically, and *support the strength* of the patient while his own forces battle with the invader. Food then becomes a prime necessity in the handling of the case, and the issue may depend upon suitable feeding.

Moreover, we are confronted with a gastro-intestinal tract which is abnormal in its functions and easily insulted. Anorexia, nausea and vomiting are consequent accompaniments of all acute febrile disturbances. The various parts of the digestive tract become impaired as the disease progresses; mastication is poorly performed or abolished; salivary digestion is diminished; gastric and pancreatic digestion likewise suffers, and not infrequently there is an absolute disgust for all foods. Nourishment administered in whatever form may lie in the stomach undigested, actually as a foreign body, provoking nausea and vomiting. It is quite apparent, therefore, that food which is most easily assimilable is an absolute need, and this means that the diet must as a rule be largely liquid.

In addition to this we are also confronted with the serious question of elimination. The increased tissue waste and the toxic products of the infectious process will in the course of elimination throw an added burden upon the emunctories. The construction of the dietary must therefore take this also into serious consideration. These general principles have been discussed elsewhere in this volume, but their brief repetition here will serve to emphasize and accentuate their great importance.

Mention may also be made of another general rule in the diet of acute febrile diseases, and that is the difference in the dietetic management during the acute stage of the disease and during its later convalescent stage. Evidently the dietetic indications vary widely in these two stages, and the considerations which influence the dietetic management at one stage of the disease are often entirely different from those influencing it at the other.

In the presence of anorexia, a rebellious stomach and an acute process of brief duration, we can afford, at least for a time, to withhold all food or to give much less quantities than the organism would ordinarily demand, knowing that this is to continue only for a short while. On the other hand, we may be called upon to face a stomach and intestinal tract still easily upset, and eliminative organs which must not be taxed too severely, while a sharp appetite insistently demands food and the patient stands in need of all the nourishment which his digestive tract can manage.

It must not be forgotten that the toilette of the mouth is a matter of great importance, especially in the dietary management of many febrile diseases. In the acutely ill, food should be administered in measured quantities at regular intervals, the rule being little and often rather than otherwise. Of course the matter of quantity of food, caloric values, balance of the various components and other similar questions must not be neglected, as has been pointed out in detail elsewhere in this work. The question of drink also arises in all cases of febrile illness. Such patients are frequently thirsty. Liquids, not necessarily nourishing, are often desirable and beneficial. The character and quantity of such liquids will require thought. As a rule, water is of course the chief consideration. Aëration and modification in various ways are often of value, in appealing to the tastes of the patient and ensuring his coöperation.

In the discussion of the dietetic management of infectious diseases, one or two further general considerations should be mentioned. The first of these is prophylaxis. This is sometimes a matter of much importance, especially in infections which gain their entrance to the body through the mouth and the gastro-intestinal tract. This question concerns not only food which may be infected with specific microorganisms, but also a careful regulation of the general diet, in order to maintain at a normal standard the protective juices and acidity of the stomach. Indiscretions in diet by interference with digestion may play no small part in increasing susceptibility to those infections which gain entrance to the body through this channel.

The diet adopted by visitors to tropical countries is important, and most of the affections here considered are classed as tropical diseases. The visitor to the tropics will usually find that in his adjustment to his new environment the question of food becomes an exceedingly important one. (*See* Volume II, Chapter XII, p. 386, *Diet in Tropical Countries*.) The required change is not infrequently a sharp modification in dietetic habits, always a matter of consequence to one's well being. Dietetic

errors are usually more marked under these conditions, and the abuse of alcohol is not uncommon. (*See* Volume II, Chapter XII, p. 401, *Alcohol and Beverages in the Tropics*.) One's work and exercise are lessened and the heat is often a disturbing factor. The use of drugs, such as prophylactic doses of quinin, may play a minor part. Mental depression and indifference to food are also encountered. There is likely to be an undue use of canned foods, and the question of the preservation of various foodstuffs and their protection against ants, flies and other insects is often a difficult one. Fresh milk not infrequently is very difficult to procure and handle in a safe and satisfactory manner. In order to possess health, these and many other factors must receive the most scrupulous care and attention. Details cannot be left to the native servants, who are only too often careless and dirty to an unsuspected degree.

The particular diseases under consideration in this section, it may be noted, are all infectious diseases, and might all be classed as acute infections. A closer examination, however, will show that two of the group, that is relapsing fevers and sleeping sickness, do not run their course with the very acute, almost explosive violence, which characterizes, as a rule, the rest of the group. In a general way, then, these diseases, so far as their dietetic management is concerned, may be somewhat roughly divided into two groups.

In diseases of comparatively brief duration, the diet must be largely if not exclusively fluid. Smaller total quantities may be given for the time, or food may be withheld entirely. Whatever is given must be in small quantities, frequently repeated. Beverages may be iced with advantage. Milk in some form is the chief dependence, always diluted, and not infrequently modified in various ways. Use may also be made of albumin water,¹ rice or barley water,² thin gruels,³ and sometimes clear soups.⁴ Fruit juices may be helpful, especially in the administration of water, which is often important.

In contradistinction to the acute processes, chronic or prolonged febrile infections require effort and persistence in supplying the patient with sufficient food. Such efforts are often wearisome to the patient and a tax on the doctor and the nurse, but a constant supply of food is essential. Fluids may be used as above, but in addition soft foods must be added. Milk and eggs represent important components of the diet. Cautious resort may be made to some of the prepared foods, especially modifications of milk. Broths of various kinds may prove useful, with crack-

^{1 2 3 4} For formulæ *see* Volume III, Chapter XXVIII.

ers and toast, meat juices, and perhaps fish or shellfish. Some of the more digestible vegetables and fruits are occasionally serviceable. Jellies, custards, ice cream, sherbet and junket often help. Coffee, tea or cocoa, mostly milk, can be permitted. In serving the food, care must be taken to make it appear as dainty and attractive as possible, and unconsumed portions should be promptly removed and not left at the bedside. This may seem a small matter, but is of sufficient importance not to be neglected. The appetite, under the circumstances, is often fickle and a disgust for food is easily created.

After this brief statement of generalities, we now turn to the specific diseases under consideration, beginning with the group which in onset and duration display the more acute phenomena.

ACUTE INFECTIOUS DISEASES (*Continued*)

Foot and Mouth Disease.—This is primarily a disease of cattle, where it constitutes a serious economic problem. It is highly contagious and is at times conveyed to man. Human cases are not of sufficient frequency, however, to render the disease of great importance in mankind. When it does occur in man, it appears as an acute febrile affection of rather brief duration, characterized chiefly by a vesicular eruption of the mouth and extremities. The vesicles in the mouth rupture and may leave rather large, superficial, somewhat indolent ulcerations. This is the most serious feature of the disease, for it is the cause not only of pain and discomfort, but interferes with the nutrition of the patient. In the extremely young or the aged it might acquire gravity, although as a rule the disease does not lead to death.

DIET IN FOOT AND MOUTH DISEASE.—The dietetic management of such cases is not of great importance. The general principles which obtain in any mild, brief, febrile illness are generally applicable. On account of the local conditions in the mouth, hot and highly seasoned foods must be avoided, and only liquids or very bland, soft foods can be tolerated. Convalescence does not require any peculiar management.

Milk or its products, from cows having foot and mouth disease, unless pasteurized or sterilized, may convey the infection to those who use it.

Plague.—This disease may appear under more than one form. That is to say, we may meet at one end of the scale an exquisitely acute, fulminating septicemia with death in twenty-four hours; or at the other end a much milder type of infection showing varying degrees of constitutional disturbance and the local development of buboes, which not infrequently

slough. In addition, there is also the almost invariably fatal, pneumonic form of the disease.

While there are ambulatory cases of plague, the disease is usually severe and acute, with great prostration. Cardiac weakness and septic processes intervene as the disease progresses. Convalescence is likely to be slow and long drawn out, with marked debility and disinclination for mental or physical exertions. The duration of the disease is from two or three weeks to several months.

DIET IN PLAGUE.—The dietary management is of subsidiary importance. During the rather brief period of acute manifestations, liquids alone can be given. If the patient survives and convalescence is established, good and abundant food of all kinds can be freely given. There are no special indications. Perhaps a convalescent diet too rich in nitrogen had best be avoided, as this will throw too much of a burden on the kidneys. Cases with septic processes, which are likely to be slow in healing, will need an especially generous diet.

Yellow Fever.—While yellow fever occurs in varying degrees of severity, being often especially mild in children, it is met at the bedside as a highly acute infection, of some four to six days' duration, marked by great prostration, a moderately high febrile curve, with a tendency to suppression of urine and "black vomit," the two symptoms most dreaded in this disease. It is sometimes seen as a fever of two paroxysms with an intervening so-called "stage of calm."

DIET IN YELLOW FEVER.—The dietetic management of these patients is of paramount importance. The cardinal features of treatment are rest with brisk, early purgation, a proper supply of fluids, and diet. Under this regimen the mortality is sharply decreased.

During the acute stage, that is, the first three or four days of illness, especially if the temperature be 102° F. or above, no food at all should be given. The time is brief and the patient will not materially suffer. Men of experience practically all agree upon the great importance of allowing no food at this stage.

The question of fluids will, however, demand consideration. The patient is thirsty, and the administration of fluids is wise and beneficial. The dominant indications are to stimulate free action of the kidneys and avoid the inducement of vomiting. There is also intense congestion of the gastro-intestinal tract, and from the usually very acid character of the vomitus it has always been inferred that gastric hyperacidity exists at this stage. The urine is likewise highly acid.

The administration of a bland alkaline fluid would seem to meet the

indications. For this purpose, Vichy is highly recommended. Perhaps any form of Vichy will answer, but many experienced clinicians insist upon the Vichy from Celestine Springs (Celestins). In the absence of this, any good aërated water with the addition of bicarbonate of soda (60 grains to the quart) may be used. A grateful effervescing drink may be preferred with sodium bicarbonate and lime or lemon juice, but care should be taken that the mixture is neutral or alkaline.

The fluid should be iced and given freely, two to four quarts daily, provided it is absorbed and does not create nausea and vomiting. The giving of small quantities at frequent intervals is the safer method of administration. Warm alkaline bicarbonate solution may be introduced by the bowel, if necessary.

The celebrated mixture of Sternburg may be mentioned in this connection. This is composed of Sodium bicarbonate grs. CL, Mercury bichlorid gr. $\frac{1}{3}$, water oz. LX. It is prescribed in dosage of one and one-half ounces every hour.

The early acute stage having passed, the demand for food now becomes pressing. Caution is still necessary. Imprudences in diet in yellow fever exact heavy penalties, and death may be the consequence. If the temperature is below 102° F., liquids may be cautiously given in the form of Vichy and milk or albumin water. Many men of experience, however, do not regard milk favorably in this disease. Broths are not thought especially advisable on account of the condition of the kidneys. Very soft boiled eggs, if fresh, may prove useful. Barley water and thin gruels are often serviceable. As convalescence progresses, the diet is gradually increased by the addition of soft foods, and when it is safe, a generous diet is needed to restore the strength of the patient. The kidneys, however, must be constantly watched.

Cholera.—Cholera is another severely acute infection which customarily passes through its various stages in a comparatively brief period. In the acute stage the incessant vomiting and purging effectually prevent the administration of any food, even if it were advisable to give it. The urgent needs of the patient now are rest in bed, warmth and fluids. No attempt should be made to give food. Cold water may be allowed freely even if vomited, since in this way it washes out the stomach and aids in the elimination of toxic material.

The administration of fluid is now recommended intravenously. This may be regarded more as a therapeutic than a dietetic measure, and its consideration is beyond the scope of this article. (*See* Volume III, Chapter XXVI.)

DIET IN CHOLERA.—The acute stage passed, the patient enters upon convalescence greatly weakened and in urgent need of an abundant supply of good food. The entire gastro-intestinal tract, however, has been the seat of an unusually acute process which has left it damaged and very much impaired in function. Food must be given with great caution in order to avoid relapses and less serious disturbances. Begin with thin arrowroot, and continue with milk mixed with soda water, etc. Meat extracts and broths are best avoided. Stimulants should only be given with great moderation, and carefully by the mouth, as at times they are apt to do more harm than good. In the algid stage, strong black coffee may be used as a cardiac stimulant. Thin gruels, barley water, rice water, albumin water, milk, and Vichy, or a similar aerated water, will serve for a beginning. To these may be gradually added soft boiled fresh eggs, milk toast, jellies, custards, junket and bland, soft foods till the patient finally reaches the generous diet which he sorely needs for recuperation.

During the prevalence of cholera, prophylaxis by the diet is of immense importance. This infection, like typhoid fever, is conveyed through the mouth. Scrupulous care and cleanliness are therefore essential to avoid infection. Especial attention must be given to foods used raw, such as milk, salads, fruits, etc. It is also wise to live frugally and eat plain, simple foods in order to avoid any upset of the gastro-intestinal tract. This helps to preserve good general health and keeps intact the gastric acidity which is a barrier to infection.

Relapsing Fevers.—There are several varieties of relapsing fevers, but from a dietetic standpoint they may be treated as one. Though varying in severity, they are all similar in symptomatology. They are characterized by an acute febrile process of a few days' duration, which may be repeated one or more times with intervals of apparent recovery.

DIET IN RELAPSING FEVERS.—During the acute stages the dietetic treatment is similar to that of any acute febrile disturbance and needs no special comment. The repetition of the acute process gives these infections, from a dietary standpoint, somewhat the character of a more chronic process. The demand then is for a generous and supporting diet to meet the requirements of a process which may be long continued. Abundant food of a nourishing character should therefore be supplied as indicated by the condition of the patient.

Sleeping Sickness.—African trypanosomiasis is a specific, infectious disease, caused by *Trypanosoma gambiense* and *Trypanosoma rhodesiense*. The malady develops slowly, as a rule, accompanied often by irregular fever. The lymphatic system is involved and there is general glandular

enlargement, especially noticeable in the glands of the posterior cervical triangle. Definite morbid changes are found in the brain, described as a peculiar meningo-encephalomyelitis.

It is only the early stages of the disease which offer any hope from therapy. Patients who reach the late or "sleeping sickness" stage practically all die. Prophylaxis is, of course, the important thing where it can be successfully carried out. Numerous remedies have been tried in the treatment of this disease. Atoxyl has found much favor, especially when supplemented by antimony (tartar emetic) intravenously. The use of atoxyl is not without danger, several cases of optic neuritis having been reported from its use.

DIET IN SLEEPING SICKNESS.—The disease permits no special dietary treatment, and the administration of food should be governed by general principles; that is to say, it should be as generous and supporting as conditions will permit.

Brazilian trypanosomiasis presents both an acute and a chronic type. The dietetic indications here also present nothing peculiar and the patient may be fed according to the general principles followed in acute or chronic febrile conditions.

BIBLIOGRAPHY

Some of the numerous works on dietetics may also be consulted, although the majority devote slight attention to these particular diseases. For current literature the English journal, *Tropical Diseases Bulletin*, which has now been published some years, may be consulted. This is a review of the literature relating to tropical medicine, and will put the reader in touch with everything of value pertaining to the subject.

The following is a list of some of the more important works which may be consulted:

ALLBUT-ROLLESTON. *System of Medicine*, London, 1906.

BROUARDEL and GILBERT. *Nouveau Traité de Médecine et de Thérapeutique*, vol. vi, *Maladies Exotiques*, Paris, 1906.

CASTELLANI and CHALMERS. *Manual of Tropical Medicine*, 2nd ed., New York, 1913.

DANIELS, C. W. *Tropical Medicine and Hygiene* (3 vols.), London, 1912.

GRACE and CLARAC (Direction). *Traité de Pathologie Exotique, Clinique et Thérapeutique*, Paris, 1910.

- MANSON, SIR P. Tropical Diseases, 5th ed., London, 1914.
- and DANIELS. Diet in Diseases of Hot Climates, Chapter xxviii, Sutherland's System of Diet and Dietetics, London, 1908.
- MENSE and BAEZ. Handbuch der Tropenkrankheiten, 2nd ed., Leipzig, 1913.
- OSLER and McCRAE. Modern Medicine, 2nd ed., Philadelphia and New York, 1914.
- ROGERS, L. Cholera and Its Treatment, London, 1911.
- SCHEUBE, B. Diseases of Warm Countries (translated by Falcke), London, 1903.
- STITT, E. R. Diagnostics and Treatment of Tropical Diseases, Philadelphia, 2nd ed., 1917.
- TOUATRE, J. Yellow Fever (translated by Chassignac), New Orleans, 1898.

SECTION III

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General Considerations.

Acute Infectious Diseases (*Continued*); Malarial Fevers; Black Water
Fever; Dengue Fever; Malta Fever.

GENERAL CONSIDERATIONS

The general dietary to be recommended, as a rule, in these diseases is governed by the febrile and afebrile periods, together with many complicating symptoms as seen in malaria. The fever period may vary in intensity and duration. The afebrile period runs from normal to states of collapse and prostration, and a short or long convalescence follows.

The febrile state always produces an increased waste or consumption of the body tissues, with a relative loss of body weight, depending upon the duration and degree of the fever. In this period there is a morbid change affecting the secreting glands of the stomach and intestines, which may result in a loss of appetite; inability to digest many kinds of foods, more especially the solid and semi-solid; nausea and vomiting and a disgust for food in general. Again, the destruction of body tissues is

increased proportionately to the height of the fever, and when such a condition exists for any length of time, the natural consequence is that the absorptive and digestive powers will be proportionately overcome. It would seem well in such cases to give food of a high nutritive value, in order that absorption and digestion may more evenly balance the destructive waste of body tissue.

In this waste, the albuminous tissues of the body are involved more than the fats, so it would seem best to supply albuminous food in fever cases to prevent this loss of body albumin as much as possible.

There is better prospect that albumin nourishment will compensate this albumin loss of body tissue in malarial infections and in Malta fever, which have remissions or intermissions, the cellular elements being given a chance to recover during the afebrile periods. This body loss may not be altogether due to the fever, but also to disorders of digestion and assimilation as the result of the fever producing defective nutrition, as well as to the improper administration of foods, whether of a proper or improper kind. An exaggerated quantity of food may aggravate the febrile condition by accumulating and decomposing in the stomach and intestines, thereby adding to the patient's discomfort. However, when fevers are not of long duration, and when the patient is robust and strong before being attacked by the disease, initial fasts may be instituted, and the duration of the fasting in such cases may be adapted to the attending circumstances. This applies more particularly to black water fever, dengue and some of the forms of malaria.

These fasts may cover periods of two to four days, depending entirely upon the patient's bodily strength and the probability of a short febrile period. Although liquid feeding may not be considered of great importance in acute short febrile attacks of malaria, dengue, Malta fever and black water fever, it acquires great importance in old and debilitated patients and when the bodily strength is in great need of support.

The fasting period should be omitted or shortened as much as possible, when the febrile state is expected to cover a period of a week or longer, especially when the patient is in a state of low nutrition, as is probable in malaria and Malta fever cases.

In the early collapse or prostration which follows many severe forms of malaria and black water fever, or when unconsciousness or stomach derangements prohibit the administration of foods by the mouth, highly concentrated and stimulating nutritive enemas should be given at regular intervals. (*See* Volume III, Chapter XXVI, Special Methods of Feeding.)

In the chronic forms of malaria attended by remissions and inter-

missions, we expect less waste of tissue than in black water fever, or even in the acute forms of malaria associated with a continuous high temperature. Feeding in such cases may be indulged in to a greater extent, and almost any liquid food and many of the semi-solid foods are allowed. Before attempting semi-solid foods, the digestive and absorptive powers of the patient should first be ascertained.

The normal activity of the stomach and intestines is rarely maintained in continued fevers, but exceptions do occur and food in such cases can be taken and readily digested. These exceptions may be looked for and dieted accordingly, without losing sight of the fact that the stomach and intestines are easily upset at any time, whereupon immediate measures should be taken to remedy the dietetic error by reverting to liquid diet, or discontinuing food entirely for a short period.

During fever remissions in malaria, dengue and Malta fever, the digestive organs are more active, so that it may be well, during these periods, to extend the dietary, and unless a liquid diet is indicated, to add semi-solid foods as ice-cream, fruit jellies, meat jelly, well cooked rice, blancmange, junket, custard and gruels. But these should be used moderately at stated intervals, and the slightest evidence of incomplete digestion, non-absorption or any intestinal or stomach derangements will necessitate their immediate discontinuance.

A beginning convalescence in any of these diseases is an indication for increased feeding, by giving semi-solid foods to be followed later by solid foods. As long as there are no digestive disturbances, the diet should be gradually increased, in order to replace the waste created during the disease and hasten the restoration of the patient's strength.

The nutritive value of solid foods and the patient's taste are factors to be considered when choosing a diet from the wide range of foodstuffs. Small portions of meats, vegetables, cereals and fruits, well prepared to add to their digestibility, and daintily served to augment their appetizing effect, are important in the planning of the convalescent's diet. (*See* Volume III, Chapter XXV, Diet During Convalescence.) Whenever semi-solid foods, and more particularly solid foods, are given, the patient should be instructed as to the great necessity for thorough mastication.

All authorities are practically agreed that liquid food easily digested and absorbed, given at short intervals in moderate amounts is of first importance in the proper feeding of fever patients.

Milk then, in these diseases, with the probable exception of goat's milk in Malta fever, which has been found to be the chief cause of spreading the disease, should be considered as the first liquid food, for the reason

that it is staple, easily digested and absorbed, and rarely produces putrefactive disorders in the intestines or stomach.

Whenever milk can be made safe for use in any of these diseases, and the disturbed digestive apparatus is unable to take care of the raw product, there are various methods of improving its digestibility, by skimming, boiling, diluting with water, alkaline and aerated water, dilution with amylaceous foods, addition of barley water, lime water, broths or various flavoring substances, or again, milk may be predigested as peptonized milk, pancreatinized milk, kephir and kumiss.

Any one of the above modified milks may be used very satisfactorily as a liquid diet. The other liquid foods which may be supplied to protect the tissue waste in febrile conditions, are the beef juices and beef tea of the fluid beef preparations; barley water, a demulcent and nutritive drink, among the beverages; chicken or mutton broth, among the broths and soups and the many egg preparations. (*See Volume II, Chapter XVII, Recipes for Invalid Foods and Beverages.*)

There are no curative foods for any of these diseases. Water should be used freely during the febrile conditions, for it aids in the control of the temperature, the relief of thirst, and the elimination of waste; it facilitates easy bowel movements and promotes kidney activity. Nevertheless, care should be exercised not to give too much and overload the stomach, thereby producing nausea and vomiting and interfering with digestion.

Patients who are very weak and feeble, or those who are not rational, may not ask for water, although their mouths are dry and parched. In such cases, small amounts of water should be given frequently, at stated intervals.

In the presence of symptoms of prostration, collapse or exhaustion, stimulants may be required and prove extremely serviceable. Active stimulation may be necessary when these symptoms come on rapidly. In such cases, whiskey about two ounces with equal parts of water given by rectum, may be of immense value.

After this general summary, the important dietetic considerations in malarial fevers, black water fever, dengue and Malta fever, will now be discussed separately.

ACUTE INFECTIOUS DISEASES (*Continued*)

Malarial Fevers.—Ague, paludism, acute and chronic malaria, intermittent and remittent fevers, tertian, quartan, and estivo-autumnal fever, pernicious malarial fever, swamp fever, jungle fever, mountain fever,

etc., are meant by the term "the malarial fevers." These embody a group of specific infectious fevers, due to infection of the red blood corpuscles of man by closely related animal parasites belonging to the protozoa—genus *plasmodium*.

The constancy of the body temperature is quite remarkable. The loss of heat is increased by dilatation of the cutaneous vessels and the increased flow of blood through them; it is diminished by contraction of the cutaneous vessels, and by the vascular dilatation in the splanchnic area. These variations are normally controlled by a thermotoxic mechanism in the cerebral nervous system, and there are also trophic or nutritional nerves which influence anabolism and catabolism and thereby the production of heat.

The cause for the rise of temperature in malarial fevers, according to Laveran(1) is irritation of the nerve centers due to invasion of the red blood cells by the malarial plasmodia. Baccelli believed the rise of temperature to be the result of sporulation, and consequent liberation of the young plasmodia in the blood plasma. The toxic products were interpreted by him as chemical poisons of unknown nature. This most plausible theory is accepted by leading authorities as most rationally explaining the rise in temperature in malarial fevers. Reasoning from analogy, it is impossible to believe otherwise than that the pyrexia and hyperpyrexia of malarial fevers, is due to the liberation of toxic products in the circulation during sporulation of the plasmodia, which exert their baneful effects upon the heat centers and vasomotor system. These toxins, by disturbing normal metabolism, increase the temperature. The intake of oxygen and output of carbon dioxid are increased around 20 per cent, owing to increased oxidation. With the decline of the temperature, the intake of oxygen and the output of carbon dioxid sink to normal, or below, owing to reduction of oxidation.

In a healthy body the nitrogen excretion is proportioned thus:

Urea	84 to 87 per cent
Ammonia salts..	2 to 5 per cent
Uric acid	1 to 3 per cent
Extractives	7 to 10 per cent

The urea group (urea, creatin, and ammonia) is derived from protein in general; the purin group (uric acid, xanthin, hypoxanthin, adenin, etc.,) from nucleins and nucleo-proteins only. In fever, all the nitrogen is increased, but particularly the uric acid and ammonia. That this

increase arises from the destruction of body tissues is shown by the ratio of phosphoric acid to the nitrogen in the urine. In meat, the ratio of P_2O_5 to N is 1:7.3; when a body is fed on meat, the ratio in the urine of P_2O_5 to N is 1:7.3 or 6.9.

In tissue protein, the ratio of P_2O_5 to N is 1:3.9 or 4.1; during starvation and fever, the ratio of these bodies in the urine is the same as in tissue protein.

It is well known that a healthy body at rest excretes from seven to eight grams of nitrogen daily, and when doing moderate work, eleven to twelve grams daily; but in febrile diseases, such as malarial fevers, typhoid, etc., the excretion of nitrogen rises to eighteen to twenty grams a day. It is evident, therefore, that more protein is called for during fever to protect the cells which are sound, to replace cells damaged by disease or broken down by oxidation, to supply amino-acids for consumption by the phagocytes, and for the formation of antibodies. It was once taught that if solid food were allowed in malarial or typhoid fevers, it could not be digested or assimilated and would, therefore, increase the temperature, but recent observations have exploded that dogma, and it is now known that digestion, absorption and assimilation are not more than from ten to twelve per cent below normal. Hoesslin, after extensive observations, is confident that digestion and assimilation in malarial fevers, is very little below normal. He fed patients with moderate fever (100 F. to 103 F.) on milk, eggs, soup, porridge, custards, cereals, etc., and found that digestion and assimilation did not materially differ from that of healthy persons.

DIET IN MALARIAL FEVERS.—During absolute rest in bed, a healthy individual weighing from 120 to 160 pounds will use up 1,500 to 1,700 calories of energy; during fever, the expenditure reaches 1,800 to 2,200 calories. Therefore, it is evident that unless a patient's dietary furnishes the requisite energy, it must be taken from his body. The dietary must furnish 60 to 80 calories per day per kilogram of body weight with a protein content of 95 to 105 grams; fat content of 100 to 125 grams, and carbohydrate content of 200 to 250 grams per day. To meet the increased loss of nitrogen during continued fevers, the dietary should contain 1.5 to 2.0 grams of protein per kilogram (0.75 to 1.0 gram per pound) of body weight, or a total of from 95 to 125 grams of protein per day. In continued high temperature, the radiation of heat is increased 20 per cent, which comes from the patient's tissues, and is one of the causes of emaciation along with the increased combustion or oxidation of carbon. The carbon oxidation can be held in check by the administration of gelatin,

fat, and carbohydrates in the food. According to Sicke and Weiske(2), 100 grams of starch will diminish the catabolism of protein 19 to 21 per cent, and 100 grams of fat will diminish it 30 to 40 per cent. Whether carbohydrate or fat should be given as a protein-sparer, partly depends upon the patient's appetite; fat is more easily digested during high fever than carbohydrates, but patients frequently object to fat, such as butter, cream and egg, more readily accepting jelly, gelatin, sugars and farinaceous foods.

If the patient prefers fats, it may be well to administer fats during the height of the fever and urge carbohydrates during the intermittent stage. The carbohydrate food can be given in the form of dextrin, maltodextrin, maltose, lactose, or saccharose. These carbohydrates are absorbed during fever almost as completely as in health. The protein sparing action of disaccharids is about the same as that of the polysaccharids (e. g., starch and dextrin), but the polysaccharids take up more energy in digestion than monosaccharids (dextrose, levulose, and galactose). Carbohydrates protect the tissues against destruction, afford heat and energy to the body, prevent acidosis and toxemia, and assist in a rapid convalescence and return to normal health. Kendall(3) believes that most bacteria utilize carbohydrate in preference to proteins, and when plenty of sugar is available, they do not attack proteins, consequently no toxins are liberated and bacterial action is changed from putrefaction to fermentation.

As the malarial infections are intermittent, and the continuous and remittent forms develop only through the maturity of the plasmodia of many generations at different intervals, the classification into intermittent, remittent and continuous forms is not altogether accurate from a clinical point of view. It is nevertheless a good classification from the viewpoint of the dietetics of this disease. The time of the paroxysm may be noted by the growth of the parasite in the examined blood and the patient's feeding modified accordingly.

LIQUID DIET.—Liquid diet may be commenced shortly before the temperature is expected to rise. Besides the blood examination, there may be many distinctive symptoms in the patient's history or condition indicating this period for beginning liquid diet, which is best continued throughout the sweating stage, although this period is only of a few hours' duration. Following this, the temperature drops below normal, accompanied by considerable weakness. At this period, it would seem best to administer stimulating beverages, following the liquid diet with semi-solids and later solid foods,

As many of these malarial paroxysms vary from a few hours to less than twenty-four hours, it would seem best to give liquid diet through these periods, or to institute complete starvation if the stomach is very much upset. Semi-solid foods are permitted during the cold stage or afebrile period. Whenever the fever is remittent, it is advisable to continue liquid diet throughout such periods, but in case of run down nutrition, in anemic patients, the semi-solid foods may be given to great advantage, and continued so long as there is no derangement of the stomach or intestines.

DIET IN RELATION TO SYMPTOMS.—Pernicious malarial infections may be caused by all forms of malarial organisms, the estivo-autumnal form being the usual cause. It is not so much the forms as the symptoms that guide us in regulating the dietary of malarial fever patients.

In considering the dietetics of the pernicious forms of malaria, that classification is best which designates each form by certain marked clinical symptoms, such as the *comatose*, *cardialgic*, *bilious*, *dysenteric*, *delirious*, *eclamptic*, *hemorrhagic*, *pneumonic*, *tetanic* and *algid* types.

In these forms the symptoms will guide us in the best methods for administering food. Easily digested nutritious liquid foods given at frequent intervals, in such quantities as not to overtax the digestive organs, constitute the best mode of feeding in the pernicious types of malarial fevers. In some cases, when the patient is in an unconscious state, as in the *comatose* form, or when the stomach is so upset that no food can be taken by mouth without causing nausea and vomiting, nutrient enemas are required to maintain stimulation and nutrition. (See Volume III, Chapter XXVI, Special Methods of Feeding.) In the *algid* form the body is cold, the skin cyanotic and bathed in cold sweat, prostration and collapse are present to a severe degree. Quick stimulation with hot stimulating beverages by mouth, and hot nutrient stimulating enemas are necessary. Active stimulation is best applied by the rectum, whiskey diluted with equal parts of water being very useful. Nutrient enemas are advised in the *bilious* form, for in these cases the stomach is irritated, and may find it difficult to retain anything, even water.

In the *dysenteric* form, it is not always the fever that calls for a liquid diet, but the state of the patient's stomach and intestinal tract, for in most of these cases, a liquid diet alone can be retained. It must be borne in mind at all times that the patient's symptoms rather than the type of infection must govern the dietetic treatment of malarial infections. Many chronic diseases, such as chronic dysentery, chronic diarrhea, pulmonary tuberculosis, amebic dysentery, and others, may complicate malarial in-

fections, and mask the symptoms of the latter, or there may be latent malarial infections, in all of which instances, the patient's condition will determine the proper dietary.

Malarial cachexia exists in patients who suffer from repeated attacks, the most characteristic symptoms being anemia and enlarged spleen. These cachexias are mostly seen in tropical and subtropical countries, and are the usual result of improper treatment, or lack of treatment in patients with latent or masked symptoms. The anemic condition may be associated with a loss of appetite, emaciation, nervousness and exhaustion in many cases, so that easily digested and nourishing diets should be prescribed, beginning with liquid foods given frequently in small quantities, to be followed by semi-solid and finally solid food; the transition from one to the other should be gradual.

Summary.—As a summary, it may be stated that a liquid diet should be given frequently and in small amounts to protect tissue waste, and sustain the patient's strength. This diet may consist of milk, milk modifications, fluid beef preparations, cereal beverages, broths and soups. When giving this diet, always guard against stomach and intestinal derangements, for too much food is apt to upset the digestive apparatus.

A light diet should be maintained as long as the temperature rises throughout any period of the day. Following all paroxysms, the patient should have as highly nutritious diet as possible, especially in cachectic conditions, when the strength is very much reduced. Special dieting and stimulants should be considered whenever called for by symptoms as noted in many of the pernicious forms of malaria. In the malarial remissions, it is best to give the greater portion of the food when the temperature is lowest. At that time, the stomach and intestines are in a better condition to assimilate the food. When remissions are low, the diet may include a greater variety of liquid and semi-solid foods, care being always taken not to upset or impair digestion. Whenever malarial fevers are protracted or severe, it is well to be on the safe side and keep to liquid feeding, but make sure that the patient is not suffering from lack of nutrition.

To avoid digestive disturbances that occur so easily and frequently in malarial fevers, feed frequently in small amounts. Avoid all foods that disagree with the patient, and give the diet best adapted to relieve the digestive organs of unnecessary work and keep up nutrition.

Black Water Fever.—Malarial hemoglobinuric fever, bilious hemoglobinuric fever, bilious remittent fever, hemorrhagic malarial fever, are names for an acute specific disease, characterized by great blood destruction and hemoglobinuria.

A history showing previous attacks of malaria and the administration of quinin may help to differentiate black water fever from yellow fever. The exact cause of the disease is in dispute, but the causal factor is of small importance for the dietetics of this disease once the diagnosis is established. A patient suffering from black water fever, even in the mildest form, should be confined to bed, the body surface should be protected from changes of temperature, the room should be comfortably warm, and water, barley water, soda water, albumin water and warm drinks should be given freely and frequently. It is highly important to keep the kidneys flushed in this disease. If the stomach is upset so that liquids are not retained, try saline injections by the rectum; if this cannot be done successfully on account of diarrhea, use saline subcutaneous injections as described in Volume III, Chapter XXVI.

DIET IN BLACK WATER FEVER.—The kind and form of feeding necessary depend on the symptoms of the mild and grave forms of the disease. During all active symptoms, when the stomach is not irritable and vomiting not present, hot soups, beverages and milk, pure or in moderated forms are best administered in small amounts at frequent intervals. Water should be freely supplied to relieve thirst, and assist in the elimination of waste matter produced through increased rate of metabolism. The water may be given cool or in the form of ice. Care should always be taken not to overtax the digestive apparatus. Symptoms of prostration or collapse call for stimulants administered by mouth or rectum. Champagne sometimes proves of immense value when the stomach is greatly irritated and unable to retain any kind of food.

Nutrient enemas should be given when the stomach is irritated and vomiting is present, or the patient is in a semi-conscious or unconscious condition as often seen in the grave forms of this disease. When convalescence begins, nutritious feeding is essential, for the patient has passed through a severe debilitating period, and must regain his strength as well as possible. This is accomplished by frequent feedings of easily digested and readily absorbed foods, first the semi-solid, and then the solid variety.

Dengue Fever.—"Break bone" fever is the name applied to an acute specific, highly infectious, non-contagious fever, peculiar to warm climates. It is characterized by two febrile paroxysms separated by an intermission or remission, without jaundice, albuminuria, or hemorrhages, and with a marked leukopenia. Its etiology is at present unknown.

DIET IN DENGUE FEVER.—In view of the course of this disease, with its low mortality and the severe associated symptoms, dietetics may

materially assist in the relief of the patient's distress. The usual liquid diet should be considered during the febrile periods, and a semi-solid diet during the period of calm and convalescence, the calm period following the first febrile period, and the convalescence following the second rise of temperature.

Milk when obtainable would seem the most appropriate food during the febrile periods, and should the patient object to its taste, there are many ways of making it more palatable or digestible by the addition of flavoring substances such as coffee, chocolate, cocoa, or meat extracts. When stimulation is needed and alcohol is not contra-indicated, whiskey, sherry or rum may be added. Barley water, fluid beef preparations as beef juices, broths and soups may all be given, alternating them when found advisable. Thirst should be relieved by frequently giving water in small amounts.

When food is given by the mouth, care should always be taken to prevent overtaxing the digestive organs.

During the afebrile periods of calm and convalescence, semi-solid foods may be administered along with the liquids, but it is sometimes advisable to continue the liquid diet throughout the period of calm and give semi-solid foods during convalescence, such as blanchmange, oatmeal, gruel, corn starch, thoroughly cooked rice and jellies. All these foods should be given in moderate quantities at frequent intervals, to be followed later by solid foods.

Malta Fever.—Malta fever or undulant fever, Mediterranean fever, Gibraltar fever, etc., is a disease of low mortality, indefinite duration and irregular course. It is an infectious disease caused by the *Micrococcus melitensis* found in the spleen, liver, kidney, lymphatic and salivary glands, the blood, bile and feces.

DIET IN MALTA FEVER.—As there may be several relapses of fever in this disease lasting several weeks, with periods of remission of from a few days to several weeks, the method for dieting is best divided into liquid feeding for the febrile periods, and semi-solid foods with stimulants during the remissions.

During the initial fever, and in the relapses to follow, the liquid diet may consist of beef juices, barley water, soups and egg preparations, given at short frequent intervals. The milk of goats in infected regions should be avoided, or boiled before use if it is the only liquid food obtainable. As there is a loss of appetite, the patient's taste should be consulted as to his preference among the liquid foods, and these should be administered with care in order not to overtax the stomach.

As the first remission is only of short duration and a prolonged siege of relapses may be expected, care must be taken during this period not to overtax the digestive apparatus. It is, therefore, advisable to continue the liquid feeding during this period and throughout the first period of relapse.

During the second and third periods of remission, both of which last several weeks, semi-solid diet is indicated in order to sustain and increase the patient's strength. Debility as a rule begins to manifest itself during the second relapse, and it is at this time that stimulation is required. Whiskey, about two ounces diluted with water, may be given for this purpose, or rum and sherry substituted.

Liquid diet should be given during the third period of relapse and continued until convalescence sets in, when semi-solid and solid foods may gradually be added to the diet.

Care should always be taken to exclude from the diet all articles of food which may contain the causal organism of the disease, for the reason that infection usually occurs through the alimentary tract. All milks, especially goat's milk as already stated, should be thoroughly sterilized by boiling or pasteurization, chiefly for the reason that this food is the main cause for spreading the disease.

As a general rule, it may be said that liquid diets should be administered during the febrile periods, and as hyperpyrexia is one of the most dangerous symptoms during the disease and one of the most difficult to treat, abundant fluid is necessary to solve the thirst problem and wash out the waste matter produced through increased rate of metabolism. Care should always be taken not to overtax the digestive organs, and water and liquid food are best given in small quantities at frequent intervals.

REFERENCES

1. LAVERAN. *Traité du Paludisme*, Paris, 1898.
2. SICKE and WEISKE. *Ztschr. f. Physiol. Chem.*, 1896, vol. xxiii, p. 265.
3. KENDALL, A. I. *Bacteriology, General, Pathological and Intestinal*, pub. by Lea Bros.; *see also* vol. i, chap. vii.

SECTION IV

FREDERICK J. SMITH, A. M., M. D., (OXON.) F. R. C. P. (LOND.)
F. R. C. S. (ENG.)

Diet in Infectious Diseases (*Continued*): Typhoid Fever.

DIET IN INFECTIOUS DISEASES (*Continued*)

Typhoid Fever—DIET IN TYPHOID FEVER.—Many years ago as Medical Registrar at the London Hospital, I was much struck by two very prominent features among the cases of typhoid in the hospital. The first was the training of the patients for something other than milk as food—the universal regulation for the feeding of typhoids was three ounces of milk every four hours, whether they wanted it or not, until the temperature had been normal for over a week; the second, the number of relapses that occurred within two or three days, or even earlier, upon a resumption of more solid food—although this was usually only a bit of soft bread and butter and a lightly boiled egg.

When I arrived at a position of more authority with patients of my own, I determined to experiment to see whether both these undesirable events could not be avoided by boldly allowing a less restricted dietary all through the illness. With authorities denouncing any other diet than milk and threatening hemorrhage and perforation if solids of any sort were allowed while the ulcers were still unhealed (a normal temperature was supposed to indicate healing), I naturally had to proceed very cautiously at first, but success in shortening the duration of invalidism soon convinced me that I was on the right track. In 1906, at the annual meeting of the British Medical Association held in Canada, I read a paper containing my experience gathered from over one hundred cases.

It would be tedious and useless to recount my earlier progress, beginning with a cup of tea or coffee, proceeding through eggs, custard, sweet-breads, tiny bits of meat, etc. It is sufficient to say that now I have arrived at the following routine method of feeding a patient with typhoid fever, a method to which I can attribute many happy successes and not a single misfortune. It can be expressed in the general terms “feed a typhoid according to his wishes, and not according to some artificial scientific plan.” A few details regarding precautions and pitfalls must, however, be added.

Let us take a case of considerable severity. Prominent among the symptoms are lassitude, headache, and loss of appetite. To be left alone and to be given some plain cold water to moisten his parched tongue, to assuage his feverish thirst, are all the patient asks. Why not accede to his desires until he does ask for something else?

Fear that the strength of the patient would give out from lack of nourishment, was an objection which I had to meet and overcome many times before I could persuade friends and nurses that not only was there no risk, but every hope of benefit. In such a fever case the tongue is not only dry, probably from mouth breathing, but dirty, and I am convinced that under these conditions, the functions of the stomach are very much impaired if not entirely in abeyance. The stomach is in no condition to digest food, even if food is placed in it. If the patient objects to taking milk or food of any sort, he is acting in accordance with his internal unconscious promptings. Food forced on such a patient will either be rejected by vomiting, a most dangerous phenomenon, or will be hurried on into a sick intestine, there to stagnate and ferment, and produce distress of the abdomen, the most fatal of all complications in typhoid. I have continued the water treatment for a week with the very happiest of results—distress has disappeared; the tongue has cleaned and appetite has shown some return. Two or three days is, however, a more average period, after which the patient commonly asks for food of some sort. Any food may be safely administered at this time with little exception. Foods containing small sharp particles which cannot be softened by the action of the stomach are the only forbidden articles in the dietary. Such forbidden foods are *grapes*, because of the peculiar shape of the pips, which are narrow at one end and can easily burrow into an ulcer, *currants*, *gooseberries*, *oranges*, *tomatoes*, *figs*, *strawberries* and all fruits with small pips or seeds, *apples* for the same reason and also because of the cartilaginous bits of core that may be swallowed; all “whole meal” preparations of grain, on account of the fine hard particles of the outer covering of the grain, *oatmeal*, and finally fragments of fish bones, even tiny ones, or fragments of ordinary bone.

Provided then that the food has no sharp particles upon which the stomach cannot act, I know of no food material which a patient may not have so far as its mere composition is concerned—every kind of meat including even shell fish, and every kind of sauce with them; every kind of biscuit made of the flour of the grain only; every kind of sugar; every kind of non-pip fruit.

Quantity is of much more importance than the nature of the food.

Speaking broadly, two tablespoonfuls of solid matter is in general quite sufficient. The liquid portion may be twice as much for a meal, and three or four meals are sufficient for a day. These quantities can be increased as the case progresses.

My golden rule from which no possible exception should be made, is that at every visit to the patient, the abdomen must be carefully palpated in order to appreciate the earliest sign of distention. The condition found at the first examination may be taken as the standard and it should never be allowed to rise above this level of natural distention and elasticity. On the old milk diet, the natural fat invariably disappeared; on a water diet it naturally has a tendency that way, but I find that by seizing every opportunity for feeding a patient who desires food, with the wish as the guiding point I have generally succeeded in maintaining a fair amount of abdominal fat and some fat in the abdominal muscles. A sinking in of the abdomen indicates occasion for asking if food is not desired by the patient. On a negative reply, water is persisted in; on a positive one, an ounce or so of some (any) food is allowed, but if, after it, there is any feeling of distention or of discomfort, water is at once resumed.

Such is a short summary of the dietetic treatment of typhoid. I may add that I adopt precisely the same views with any acute febrile condition, perhaps especially in pneumonia, where the trouble of breathing is quite enough for a patient without the discomfort of a blown-up stomach. My chief satisfaction in the treatment is the rarity of complications, such as abscess, atrophy of the skin leading to bed sores, thrombosis of veins, etc., though incidentally, I have found that I save about a fortnight in the total duration of incapacity from an attack.

There are cases of typhoid so severe from the very commencement that the patient is almost sure to die. I do not deny that I have had a certain number of deaths, but of this fact I am firmly convinced, that if the patient has a chance of life, my plan of feeding and starvation (water) *at the wish of the patient* will ensure that chance being secured. I am sure I have seen many patients actually die from routine milk feeding (at least fatal distention seemed to arise from no other cause), but I have never seen any evil results from my own plan.

Summing up my views on the dietetic treatment of typhoid fever patients, also stated in my paper read before the meeting of the British Medical Association held in Canada in 1906, it becomes necessary to repeat that such a patient ought to be allowed a much greater latitude in the way of diet than is ordinarily laid down in text books. The rules there

preached have been formulated under the terrors of perforation and hemorrhage, as though these two events were mainly if not entirely under the control of the food put into the stomach. That food may in certain circumstances produce evil effects, I am prepared to admit, but these circumstances are very definite and are only two in number; one of them can be certainly avoided and the other is fairly well under control.

The first way in which the evil effects of food can be avoided is by the withholding of the hard indigestible and sharp edges of the seeds of some fruits; for example, nuts, grapes, perhaps also oranges, strawberries, gooseberries, and figs. These fruits I would absolutely banish from the menu of the patient, allowing only the juice strained through muslin to be given by the nurse.

The second condition which may produce evil effects is the danger of giving food a little too freely or injudiciously, whether the food is milk or as advocated by me, other things such as meat, eggs, fish, etc. This overfeeding added to imperfect digestion may lead to the development of gases and cause distention. This condition or circumstance is fairly well under control. By control I mean that typhoid patients must not be fed by routine, at fixed and regular hours, totally irrespective of their appetites and condition, but each case must be taken and studied on its merits. The very last, smallest and most insignificant of these merits is the temperature, which has too long held its baneful sway over the minds of medical men and nurses, leading them to deny a hungry patient a bit of bread and butter or an egg, because the wretched thermometer revealed the fact that his temperature was not normal. The temperature indicates that the disease is possibly not yet at an end, but among all the facts we have learned of microbic diseases, there is not one that seems to me to suggest, even in the faintest degree, that depriving the patient of some much desired food is a proceeding calculated to end the trouble.

SECTION V

WILLIAM EDWARD FITCH, M.D.

Diet in Infectious Diseases (*Continued*): Typhoid Fever; Typhus Fever.

DIET IN INFECTIOUS DISEASES (*Continued*)

Typhoid Fever.—"Stuff a cold and starve a fever" was the dictum enunciated by the teachers of medicine during our student days, though long

before this Graves(1) had advocated a liberal diet in typhoid fever. It was formerly taught that the disinclination of the patient to take food was an indication that he did not need food. Besides, it was thought that foods could not be well digested and assimilated during continued pyrexia; furthermore, it was believed that the chances of hemorrhage and perforation were enormously augmented in typhoid fever by the ingestion of solid foods. Moreover, it was once taught that continued pyrexia and hyperpyrexia were associated with a toxic destruction of protein, preventing the maintenance of nitrogenous equilibrium, even if the protein intake and the total caloric intake were as high or higher than necessary to maintain weight and equilibrium in health.

The following clinicians, F. Muller(2), Benedict(3), Ewing and Wolf(4), and Grafe(5), hold that in typhoid there is a simple hyperactivity of metabolic functions which renders weight maintenance difficult.

In refutation of the non-absorption and non-assimilation of food in typhoid fever, Du Bois' experiments(6) have proved conclusively that digestion and assimilation are not more than 10 to 12 per cent below normal. Besides, he has shown that with an intake of 65 to 118 grams of protein, the loss was usually under 10 per cent; the normal loss on the same dietary being 7.9 per cent. The fat loss during the second week, with a high temperature, with an intake of 150 to 200 grams, was on an average of 8.8 per cent loss, while during the third and fourth week, with the same intake of fat, the loss was only 4.15 per cent; the normal loss with an intake of 165 grams being two per cent. The carbohydrate loss, with an intake of from 215 to 575 grams daily, was only 0.1 to 0.3 per cent; the normal loss with an intake of 250 grams being 0.1 per cent.

Graves of England was the pioneer who first realized the necessity for a liberal allowance of food in typhoid fever. Following his teaching, a few clinicians, Shattuck(7), Barker(8), Sicard(9), Coleman(10), Crohn(11) and others, cautiously began to augment the dietary of their typhoid patients. Barrs(12) and Smith in England also began to nourish their typhoid patients better than before. However, few practitioners dared follow the lead of such fearless and shrewd clinicians as Shattuck(13) and Barrs(14) against former custom, and to abandon the starvation plan of treating typhoid patients in favor of a high-calorie diet.

It remained for Warren Coleman of New York to awaken the profession to a realization of the great importance of a high-calorie diet in typhoid fever. His enthusiastic studies carried on at Bellevue Hospital(15) have revolutionized the former theory and practice of feeding

in typhoid fever. Now a more liberal diet is becoming general, though in the face of long custom, few as yet dare resort to the high caloric values reached and advised by Shattuck, Barrs, Barker and Coleman.

The researches of Coleman and his associates on protein metabolism in typhoid fever were undertaken with the idea that the destruction of body protein in fever might be reduced to normal limits by supplying large quantities of easily digested carbohydrate to the dietary to act as protein spacers.

For this experiment, they employed a Benedict universal unit calorimeter. This apparatus was devised for determining the amount of oxygen absorbed and the amount of carbon dioxide given off during the period of observation. The accompanying schematic diagram and description are taken from the writings of Coleman(16).

Barker, commenting on Coleman's high-calorie studies in typhoid, says:

"This research is one of much moment, and will be looked back on as an unusual example of metabolic study of high order." The conclusion reached from Coleman's labors(17) is that by the use of diets high in fuel value, particularly rich in carbohydrates, it is possible to prevent not only the "febrile loss" of body protein-nitrogen in patients suffering from typhoid fever, but also that due to the so-called toxic destruction of body protein. Coleman and his associates are satisfied that there is a greater need for carbohydrate in febrile conditions than in health. It is readily seen that if the carbohydrate intake is less than required in health, the body protein will be drawn on to supply energy in an available form; whereas, on the other hand, if sufficient carbohydrate is ingested, the body protein will be spared. Shaffer and Coleman proved experimentally that from 10 to 15 grams of nitrogen in the food suffice to maintain nitrogen equilibrium if a sufficient quantity of easily digested and readily assimilable carbohydrate is simultaneously ingested. According to their findings typhoid patients in the worst stages of the disease could take from 1,000 to 3,000 calories, while in convalescence an intake of from 5,000 to 8,000 calories has been recorded. Du Bois(18), working in Lusk's laboratory, carefully studied the absorption and assimilation of food in typhoid fever, and was able to confirm Von Hoesslin's(19) views. He avers that throughout the attack typhoid patients can absorb carbohydrate and protein foods as readily as normal individuals. Du Bois states further, that late in the disease, these patients can readily metabolize larger quantities of fats.

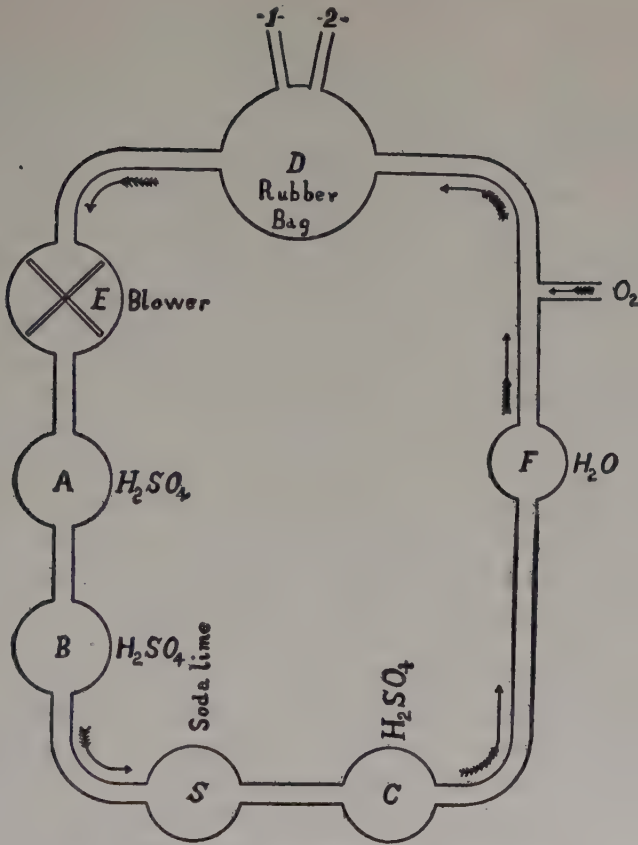


FIG. 4.—BENEDICT UNIVERSAL UNIT APPARATUS.

When a patient is connected with the machine, it is obvious that the only substances he can add to the air in the circuit are carbon dioxide and water; the only thing he can take from it is oxygen. The loss of weight by the oxygen-container and the gain in weight by the soda lime bottle (plus sulphuric acid bottle C) correspond to the amounts of oxygen absorbed and carbon dioxide given off during the period of observation. It may be added that the observations were made in periods of fifteen minutes each.

The investigations of Kocher(20), working in Frederick von Muller's clinic in Munich to determine the nitrogen metabolism in typhoid fever, led to the conclusion that with a very low protein intake and a high carbohydrate intake, the amount of nitrogen excreted in the urine can be reduced to as low a percentage as one-third of the amount given out in total fasting.

Coleman, Shaffer(21), Du Bois(22), and their associates, conducted calorimetric investigations to determine whether the high-calorie diet

exerts a beneficial or harmful influence on the patient, and whether and in what manner food is utilized after its ingestion and absorption. Coleman's experiments were all made shortly after the patients had partaken freely of food, which should be borne in mind when comparing his findings with those of previous investigators, whose patients had practically fasted from six to sixteen hours.

Coleman, explaining his research experiments, says, "The total metabolism, or heat production, was calculated from the oxygen consumption and the respiratory quotient, since the caloric value of the oxygen varies with the height of the quotient. Heat production is recorded in terms of calories per kilogram per day. The latter method is more accurate, but is less practical for routine clinical work." Coleman in summing up his observations on heat production says, "The greatest amount of heat produced by any patient, out of 106 observations, was 48 calories per kilo. per day, the majority giving off 35 calories per kilo. a day. On this basis, the high-calorie diet gives 1,000 or 2,000 more calories than are expended in twenty-four hours, and if the patients do not receive this, they lose both nitrogen and weight; later in the disease, the excess is used in storing fat."

According to Rubner, the ingestion of a hearty meal by a healthy individual will be followed by an increase in heat production, due to the specific dynamic action of the food. Clinicians in the past have assumed that food exerts a similar action in fever, which is not the case. The reason why food does not exert its specific dynamic action in typhoid fever is unknown at the present time. The presumptive evidence is not without analogy, for in health the specific dynamic action of food does not appear when metabolism is stimulated by external cold.

Coleman's studies strongly emphasize the fact that to maintain nitrogen equilibrium, from 4,000 to 5,500 calories per day are necessary to furnish 60 to 80 calories per kilogram of body weight. The most satisfactory protein intake ranges from 65 to 95 grams per day, which yields a normal amount of nitrogen, 10 to 15 milligrams, sufficient to maintain nitrogen equilibrium. The carbohydrate intake is quite important, as it acts as a protein-sparer, and in the absence of special reasons to the contrary, should make up, Coleman thinks, at least 50 per cent of the total calories. During the amphibolic period of the disease, and in the convalescent stage, fats are well borne, far better than in the earlier stages.

Coleman concludes—(a) "Food does not increase the heat production or the temperature in typhoid fever, even when given in large amounts (at least, when the quantity of protein is kept relatively low). There-

fore, the fear which has been entertained by physicians for so many years that a liberal diet would raise the temperature of the patient is proved to be groundless.

(b) "The body utilizes carbohydrate in preference to fat or protein to meet the increased demand for energy in typhoid fever, just as it does in health when called on to perform additional work. Consequently, carbohydrate should occupy a prominent place in the diet."

HIGH-CALORIE DIETS FOR TYPHOID FEVER.—The following high-calorie dietaries are compiled largely from Coleman's researches on high-calorie feeding, and a careful study of his methods shows the beneficial results obtained by this method. Any class of food that disagrees with the patient should, of course, be discontinued, lest the disturbance so caused interfere with future alimentation.

MILK, CREAM AND LACTOSE DIETS (Coleman)

<i>For 1,000 calories a day:</i>	Calories	<i>For 1,500 calories a day:</i>	Calories
Milk, 1 quart—1,000 c.c.....	700	Milk, 1½ quarts—1,500 c.c....	1,000
Cream, 1½ ounces—50 c.c....	100	Cream, 1½ ounces.....	100
Lactose, 1½ ounces—50 gm...	200	Lactose, 3½ ounces—100 gm..	400
This furnishes eight feedings, each containing:		This furnishes eight feedings, each containing:	
Milk, 4 ounces.....	80	Milk, 8 ounces.....	160
Cream, 2 drams.....	15	Cream, 2 drams.....	15
Lactose, 6 grams.....	24	Lactose, 16 grams.....	64
<i>For 2,000 calories a day:</i>		<i>For 2,500 calories a day:</i>	
Milk, 1½ quarts.....	1,000	Milk, 1½ quarts.....	1,000
Cream, 8 ounces—240 c.c....	500	Cream, 8 ounces.....	500
Lactose, 4 ounces—125 gm...	500	Lactose, 8 ounces—250 gm....	1,000
This furnishes seven feedings, each containing:		This furnishes seven feedings, each containing:	
Milk, 7 ounces.....	140	Milk, 7 ounces.....	140
Cream, 1 ounce.....	60	Cream, 1 ounce.....	60
Lactose, 18 grams.....	72	Lactose, 36 grams.....	144
<i>For 3,000 calories a day:</i>		<i>For 3,900 calories a day:</i>	
Milk, 1½ quarts.....	1,000	Milk, 1½ quarts.....	1,000
Cream, 1 pint—480 c.c.....	1,000	Cream, 1 pint.....	1,000
Lactose, 8 ounces.....	1,000	Lactose, 16 ounces—480 gm...	1,900
This furnishes eight feedings, each containing:		This furnishes eight feedings, each containing:	
Milk, 6 ounces.....	120	Milk, 6 ounces.....	120
Cream, 2 ounces.....	120	Cream, 2 ounces.....	120
Lactose, 1 ounce—30 gm.....	120	Lactose, 2 ounces.....	240

"When the above combinations are employed, it is generally desirable to add eggs to the diet in order to raise the nitrogen to the desired amount. The eggs may be soft-boiled or be shaken up in any of the above feedings unless distasteful to the patient, though the addition of an egg makes the stronger mixtures very rich." Coleman states that he has given some patients, who seemed unable to get enough to eat, four ounces of milk, four ounces of cream, two ounces of milk sugar, and an egg at a feeding. Such patients, however, are exceptional.

The following dietary furnishing 3,910 calories was used by Coleman in Ward A of Bellevue Hospital(23):

	Hours	Total	Calories
Milk, 6 ounces.....	9 A.M.; 11, 1, 3, 7	1,260 c.c.	860
Cream, 2 ounces.....	10 P.M.; 1, 4	420 "	840
Lactose, 10 grams.....		70 grams	280
			<hr/> 1,980

At 11 A.M.	Calories	At 5 P.M.	Calories
Egg, 1.....	80	Egg, 1.....	80
Mashed potato, 20 grams.....	20	Cereal, 3 tablespoonfuls.....	150
Custard, 4 ounces.....	250	Cream, 2 ounces.....	120
Toast (or bread), 1 slice.....	80	Apple sauce, 1 ounce.....	30
Butter, 20 grams.....	150	Tea	
Coffee		Cream, 3 ounces.....	180
Cream, 2 ounces.....	120	Lactose, 20 grams.....	80
Lactose, 20 grams.....	80		
<hr/> 780		<hr/> 640	

At 7 A.M.	Calories
Egg, 1.....	80
Toast, 1 slice.....	80
Butter, 20 grams.....	150
Coffee	
Cream, 2 ounces.....	120
Lactose, 20 grams.....	80
<hr/> 510	

Milk-sugar lemonade may be substituted for the milk mixture at 3 o'clock.

The dietary for the following day furnishes 5,580 calories:

	Hours	Total	Calories
Milk, 5 ounces.....	9 A.M.; 11, 1, 3, 7	1,200 c.c.	820
Cream, 2 ounces.....	10 P.M.; 1, 4	720 "	1,440
Lactose, 15 grams.....		120 grams	480
			<hr/> 2,740

At 11 A.M.	Calories	At 5 P.M.	Calories
Eggs, 2.....	160	Egg, 1.....	80
Toast, 2 slices.....	160	Toast, 2 slices.....	160
Butter, 20 grams.....	150	Butter, 20 grams.....	150
Mashed potatoes, 70 grams...	70	Cereal, 6 tablespoonfuls.....	290
Custard, 8 ounces.....	500	Cream, 4 ounces.....	240
	<hr/>	Apple sauce, 1 ounce.....	30
	1,040	Tea	
		Cream, 2 ounces.....	120
		Lactose, 20 grams.....	80
			<hr/>
			1,150

At 7 A.M.	Calories
Egg, 1.....	80
Toast, 2 slices.....	160
Butter, 20 grams.....	150
Coffee	
Cream, 3 ounces.....	180
Lactose, 20 grams.....	80
	<hr/>
	650

The following dietary contains 5,570 calories, and is suitable for convalescents:

	Hours	Total	Calories
Milk, 5 ounces.....	9, 11 A.M.; 1, 7 P.M.	1,050 c.c.	700
Cream, 3 ounces.....	10 P.M.; 1, 4 A.M.	630 "	1,260
Lactose, 15 grams.....		105 grams	420
			<hr/>
			2,380

At 11 A.M.	Calories	At 5 P.M.	Calories
Eggs, 2.....	160	Toast, 2 slices.....	160
Mashed potatoes, 80 gm.....	80	Cereal, 6 tablespoonfuls.....	290
Custard, 8 ounces.....	500	Cream, 2 ounces.....	120
Creamed chicken, 1 ounce...	50	Lactose, 20 gm.....	80
Toast, 2 slices.....	160		<hr/>
Butter, 20 gm.....	150		650
	<hr/>		
	1,100		

At 3 P.M.	Calories
Lemonade (lactose, 120 gm.).....	480
At 7 P.M.	
Egg, 1.....	80
Cereal, 5 tablespoonfuls.....	250
Cream, 2 ounces.....	120
Toast, 2 slices.....	160
Butter, 20 gm.....	150
Coffee	
Cream, 2 ounces.....	120
Lactose, 20 grams.....	80
	<hr/>
	960

The following valuable recipes are from Coleman's article:

<i>Cocoa with milk:</i>	Calories
1 rounding teaspoonful of cocoa.....	50
2 ounces of milk-sugar.....	240
4 " " milk.....	80
2 " " cream.....	120
	<hr/> 490

Mix the sugar and cocoa; cook in the milk until dissolved. Serve with the cream.

<i>Cocoa:</i>	Calories
1 heaping teaspoonful of cocoa.....	50
2 ounces of milk-sugar.....	240
½ cup of water	
3 ounces of cream.....	180
	<hr/> 470

Mix the cocoa and sugar, add the water, and boil. Then add the cream, or use less cream and serve with whipped cream.

<i>Coffee:</i>	Calories
1 ½ ounces of milk-sugar.....	180
4 to 5 ounces of strong coffee	
2 ounces of cream.....	120
	<hr/> 300

<i>Plain junket or rennet custard:</i>	Calories
25 gm. (1 ounce) of milk-sugar.....	100
5 ounces of milk.....	100
¼ junket tablet	
1 ounce of cold water	
Few drops of vanilla	
	<hr/> 200

See directions for cocoa junket.

<i>Cocoa junket:</i>	Calories
1 teaspoonful of cocoa.....	50
25 gm. of milk-sugar.....	100
5 ounces of milk.....	100
¼ junket tablet dissolved in 1 ounce of cold water	
	<hr/> 250

Mix the cocoa and sugar, add the milk, and heat lukewarm, stirring constantly; add the dissolved junket, stir thoroughly, and leave it in a cool place to set.

Soft custard:

	Calories
1 cup of milk.....	160
1 egg.....	80
2 ounces of milk-sugar.....	240
Speck of salt.....	
2 to 3 drops of vanilla, or caramel made of 3 tablespoonfuls of granulated sugar.....	20
	<hr/> 500

Beat the egg slightly, add the sugar, salt, and hot milk slowly. Cook in a double boiler, stirring constantly, until it thickens a little (if cooked too long, the custard will curdle, but may become smooth again if set in a dish of cold water and beaten at once). Flavor and cool.

To make caramel: Put the sugar in a pan directly over heat and burn until a very dark brown. Dissolve in hot water or milk.

Baked custard:

	Calories
1 ½ ounces of milk-sugar.....	160
6 ounces of milk.....	120
1 egg.....	80
Nutmeg or vanilla.....	
Speck of salt.....	
	<hr/> 360

Beat the egg slightly. Warm the sugar and milk, stirring constantly, add to the egg, strain into a custard cup, and flavor. Bake in a pan of water in a moderate oven until a knife when cut into it will come out clean (thirty minutes to one hour).

Bread pudding:

	Calories
1 ½ ounces of milk-sugar.....	180
6 ounces of milk.....	120
1 egg.....	80
1 slice of bread (¾ inch thick).....	60
½ ounce of butter.....	120
	<hr/> 560

Spread the bread with butter and cut into squares. Beat the egg slightly; heat the milk and sugar, stirring constantly; mix with the egg and pour over the bread. Grate nutmeg over the top, and bake the same as the custard.

Vanilla ice cream:

	Calories
4 ounces of cream.....	240
2 ounces of milk.....	40
2 " " milk-sugar.....	240
Speck of salt.....	
Few drops of vanilla.....	
	<hr/> 520

Mix the cream, the milk, and sugar, and heat, stirring constantly, until the sugar is dissolved. Then flavor, cool, and freeze.

Lemonade:

	Calories
4 ounces of milk-sugar.....	480
7 " " cold water	
2 tablespoonfuls of lemon juice (or to taste)	
	<hr/> 480

Boil the sugar and water for two minutes, add lemon juice to taste, strain, and cool.

CARBOHYDRATES.¹—Carbohydrate, as the best sparer of protein, is the food element with which to augment caloric increase and is best supplied in the form of milk, milk sugar, decorticated cereals, bread, toast, crackers, baked or mashed potatoes. Lactose is a very important article of diet in these cases. It is readily soluble, not very sweet, and can be ingested in large quantities without the appearance of sugar in the urine.

PROTEINS.¹—Protein may be taken in sufficient amounts, in form of eggs and milk, which are the best available foods for maintaining protein equilibrium. One and a half quarts of milk equals 53 grams of protein; two eggs equal 14 grams of protein; 90 grams, or 3 ounces of cereal, equal 3½ grams of protein; 33 grams of bread (one slice) equal 1.5 grams protein. Here, then, are 72 grams of protein which can be utilized for an arbitrary working basis, and can be diminished or increased, as the case demands. Schottmüller(24) advises as much as 100 grams of scraped beef per day, but American and English physicians think this goes beyond the optional limit—as it often seems to excite digestive disturbances and to augment renal irritation; besides, this excess is not necessary and puts an extra burden on the organs of excretion and elimination. Meat soups and beef broths are to be avoided, because of their low protein and poor caloric values, though a small amount of consommé may be given to improve the appetite. If soup is served, some cereal or egg should be added to it to increase the caloric value. Eggs may be taken raw, soft boiled, poached, coddled, or in eggnog and milk-shakes, four to eight of which may be given in the twenty-four hours.

FATS.¹—Fats are best given as cream, butter, cocoa, and yolk of egg. Coleman has given as much as 200 to 250 grams of fat per day, without causing digestive disturbances. Fat tolerance varies considerably in different persons; most people can take fats if fed gradually and with care, but in certain individuals fat causes distress, eructations, nausea, vomiting, and diarrhea. In such patients, fat should be at once reduced, and again cautiously allowed in small quantities. The fat content of ordinary

¹ Lewellys Barker in J. A. M. A., Sept. 12, 1914.

milk is considerable, and according to Coleman's plan the patient for the first two days has nothing but pure milk. If very ill, he may have a strict milk diet for a few days, of from 1,000 calories (1 liter of milk, 50 c.c. of cream, 50 grams of lactose, divided into 8 feedings) up to 3,900 calories (1.5 liters milk, 0.5 liter cream and a pound of lactose), divided also into 8 feedings in the twenty-four hours. Soft-boiled and scrambled eggs may be added to this when the patient is very ill.

RESULTS OF A HIGH-CALORIE DIET.—Sicard(25) reports a series of twenty-nine cases of typhoid fever treated in the second Division of Bellevue Hospital during the summer of 1912, in which he used the Coleman high-calorie method of feeding. The first day, quoting from his report, he fed as follows: a milk diet of 6 ounces every three hours, which is about $1\frac{1}{2}$ quarts in the twenty-four hours, having a caloric value of 1,000.

The second day, a diet is given of approximately 1,500 calories, consisting of:

Milk.....	1,500 c.c.....	$1\frac{1}{2}$ quarts.....	1,050 calories
Cream.....	120 ".....	4 ounces.....	240 "
Milk-sugar.....	40 gm.....	$1\frac{1}{2}$ oz. sugar sol..	200 "
			<hr/> 1,490 calories

This makes 8 feedings, each of

Milk.....	180 c.c.....	6 ounces
Cream.....	15 ".....	$\frac{1}{2}$ ounce
Milk-sugar.....	5 gm.....	$1\frac{1}{2}$ drams sugar sol.

On the fifth day approximately 2,000 calories:

Milk.....	2,000 c.c.....	2 quarts.....	1,400 calories
Cream.....	250 ".....	8 ounces.....	500 "
Milk-sugar.....	80 gm.....	$2\frac{1}{2}$ ounces sugar sol.	312 "
			<hr/> 2,212 "

This makes 8 feedings, each of

Milk.....	210 c.c.....	7 ounces
Cream.....	30 ".....	1 ounce
Milk-sugar.....	10 gm.....	$2\frac{1}{4}$ drachms sugar sol.

On the seventh day approximately 3,000 calories.

Milk.....	1,500 c.c.....	$1\frac{1}{2}$ quarts.....	1,000 calories
Cream.....	125 ".....	4 ounces.....	250 "
Milk-sugar.....	125 ".....	".....	500 "

In seven feedings, at 9 A.M., 1, 3, 7, 9, 12 P.M. and 4 A.M., each feeding consisting of:

Milk.....	180 c.c.....	6 ounces
Cream.....	15 ".....	$\frac{1}{2}$ ounce
Milk-sugar.....	15 ".....	$\frac{1}{2}$ "

With the following to augment the calories at 7 A.M., 11 A.M., and 5 P.M.

At 7 A.M.

Toast (one slice).....			80 calories
Butter.....	15 gm.....	½ ounce.....	100 "
Egg (one).....			80 "

At 11 A.M.

Egg (one).....			80 calories
Bread (without crust).....			100 "
Butter.....	15 gm.....	½ ounce.....	100 "
Junket.....	180 ".....	6 ounces.....	200 "

At 5 P.M.

Toast.....			80 calories
Butter.....	15 gm.....	½ ounce.....	100 "
Cereal.....	90 ".....	3 ounces.....	100 "
Cream.....	60 ".....	2 ".....	120 "
Milk-sugar.....	15 ".....	½ ounce.....	60 "

TOTAL CALORIES.....2,950

By the gradual addition of different foods, the fuel value is raised after a few days to 4,000 calories, as follows:

Milk.....	1,500 c.c.....	1½ quarts.....	1,000 calories
Cream.....	420 ".....	16 ounces.....	480 "
Milk-sugar.....	70 gm.....	2½ ".....	280 "

In seven feedings at 9 A.M., 1, 3, 7, 10 P.M., 1 and 4 A.M., each feeding to consist of:

Milk.....	180 c.c.....	6 ounces
Cream.....	60 ".....	2 "
Milk-sugar.....	10 gm.....	2½ drachms sugar sol.

At 7 A.M.

Egg (one).....			80 calories
Toast (one slice).....			80 "
Butter.....	15 gm.....	½ ounce.....	100 "
Coffee			
Cream.....	60 c.c.....	2 ounces.....	120 "
Lactose.....	15 gm.....	½ ounce.....	60 "

At 11 A.M.

Egg (one).....			80 calories
Toast or bread.....			180 "
Butter.....	15 gm.....	½ ounce.....	100 "
Mashed potato.....	15 ".....	½ ".....	15 "
Custard.....	120 ".....	4 ounces.....	250 "
Coffee			
Cream.....	60 ".....	2 ".....	120 "
Lactose.....	15 ".....	½ ounce.....	60 "

At 5 P.M.

Egg (one).....		80 calories
Cereal.....		100 "
Cream.....60 gm.....		120 "
Apple sauce.....30 ".....		30 "
Tea		
Cream.....60 ".....		120 "
Lactose.....15 ".....		60 "

TOTAL CALORIES.....3,770 "

For still higher values, we give the following 4,500 calories:

Milk.....1,260 c.c.....	860 calories
Cream.....420 ".....	840 "
Milk-sugar.....105 gm.....	440 "

Sicard concludes that the high-calorie feeding in his twenty-nine cases of typhoid "shows a cleaner, moister tongue, more comfortable mouth, less offensive breath, less emaciation, less nervous exhaustion (which was slowed by continuous muttering and constant picking at the bedclothes); a cleaner, healthier skin, greater comfort, less diarrhea, probably lessened mortality, and fewer complications." The most evident features of the high-calorie feeding are the sustenance of weight and nutrition, the amelioration of hunger, and the lessened tedium of convalescence.

Kinnicutt(26) analyzed 733 cases in his experience on a liberal diet, finding that relapses were not increased, while hemorrhage and perforation were diminished.

Kinnicutt's interesting figures go far toward proving that it is quite safe to give a liberal dietary to the typhoid patient. He has collected the records of 4,654 cases treated with a spare fluid diet and of 733 with a liberal diet and the results are as follows:

RESULTS OF HIGH- AND LOW- CALORIE DIET IN TYPHOID FEVER

CASES	Relapses %	Hemorrhages %	Perforations %	Mortality %
On liberal diet..... 733	11.38	4.27	1.36	9.47
On fluid " 4,654	10.89	8.33	2.40	10.55

Coleman(27), in his 111 cases fed on high-calorie diet, finds that relapses are not affected, while hemorrhage and perforation are lessened.

Shaffer(28) found that a patient with typhoid fever rarely received more than 50 per cent of his dynamic needs, and that this contained proteins far in excess of the normal proportion.

Bushuyez(29) treated 398 cases with a most extravagantly liberal diet and reported few relapses, only four hemorrhages and a mortality of only 8.2 per cent.

The dietetic requirements of the typhoid patient exceed those of a healthy individual, if confined to bed. Coleman says:

The increase in total metabolism which occurs in typhoid fever creates a demand for more food than would be necessary to maintain equilibrium in the same patient in health, if he were confined to bed. The average increase during the course of the fever reaches about 34 per cent, but, for reasons which are not yet apparent, an amount of food which is just sufficient to cover heat production will not protect the body protein.

It has been emphasized by competent authorities in high-calorie feeding, that a much greater quantity of food is required to meet the metabolic demands, and that the quantity varies with different individuals. Rolland(30) found that his typhoid patients required 45.5 calories per kilogram per day to maintain nitrogen equilibrium, while Shaffer and Coleman(31) were unable to establish nitrogen equilibrium in any patient with less than 58 calories per kilogram per day, and in one instance, even 85 calories per kilogram were necessary.

Careful clinical experimentation has established the fact that the typhoid patient should ingest food sufficient to yield enough energy to cover his heat production, which, according to Coleman, amounts to an average of 36 calories per kilogram per day, with the patient at complete rest, quietly breathing into a respiration apparatus. Ordinarily, though, patients roll and toss about in bed, which increases metabolism at least 10 per cent, consequently taking careful account of the basis of heat production, the food ingested should yield about 40 calories per kilogram per day. Coleman says food in the above amounts "will not maintain a patient in nitrogen equilibrium; and asks, Shall the typhoid patient be dieted merely to cover the heat production, or shall an attempt be made to protect body protein"? The answer to this question, in the face of facts presented, is obvious.

While it is true that countless numbers of typhoid patients—on the old antiquated starvation plan of treatment, have survived the loss of large amounts of body protein, drawn for the most part from their own muscles, still, on the other hand, how many thousands have died because such loss was not prevented? In health, a normal individual losing protein-

nitrogen is not receiving a sufficient quantity of food; and therefore, a typhoid patient who is losing nitrogen, is consuming his own muscles to supply the deficit in his food. Besides, as Sicard says, "*Poor nutrition means lowered resistance, inability of phagocytes to contend with the invasion of bacteria, inability of the constructive to cope with the destructive processes of metabolism.*" And again, we emphasize the fact that a normal man cannot be maintained in nitrogen equilibrium if his food allowance is only sufficient to cover his basal heat production.

Sir William Osler(32), in discussing the dietary for typhoid patients, says that the essential foods during the febrile period are milk, eggs, and water. He advocates four ounces of milk diluted with two ounces of lime water, Poland water or White Rock every four hours; and an alternate feeding every two hours, of four ounces of albumin water made with the whites of two eggs, lemon juice, sugar and ice. Thus the patient has food every two hours. Osler's patients have this dietary alone during the febrile period. If the stools show any evidence of curds, the milk is withheld and whey substituted. If signs of distention appear, the milk and whey are both cut off altogether, and the albumin water increased, or buttermilk, kumiss or peptonized milk may be given. Osler believes in allowing the patient liberal quantities of water. He advocates placing a jug of water alongside the bed, to which is attached a piece of rubber tubing with a "glass mouthpiece," so that the patient can drink at will. This "washing out" plan is advised by E. W. Cushing and T. W. Clark of the Lakeside Hospital of Cleveland, Ohio, and a gallon or more of water may be taken daily. This flushing of the sewers washes out the toxins. Barley water, lemonade, or iced tea may be allowed. Bouillon¹ or strained vegetable soup may serve as an agreeable change in the dietary. Ice cream is allowed at any time.

When the digestion of milk is difficult, it is well to add to it hot water, or dilute it with alkaline or carbonated water. The purpose may be served equally well by flavoring it through the addition of vanilla, nutmeg, coffee, tea, or cocoa in small amounts. After the first week or ten days, the typhoid patient may be safely allowed two soft-boiled eggs twice a day; they should be so soft as to be more readily drunk than eaten. Well boiled brown rice strained through a fine sieve may be given with advantage several times a day.

For twenty-five years the author has fed patients liberally in typhoid, with much satisfaction. A patient returning to the city after a summer in

¹ For directions see Volume III, Chapter XXVIII.

the country, came down with typhoid (1889). I called in two confrères in whom I had confidence. They were believers in the starvation dietary and in Woods' turpentine treatment internally and externally. The patient did not progress satisfactorily under this plan of treatment, two copious hemorrhages adding gravity to the case, and weakening her beyond expression. When she had slightly recovered from the hemorrhage, her piteous pleading for food was heeded. A consultation was hurriedly called, and on my earnest solicitation, a liberal high-calorie dietary was outlined. Two ounces of milk to one ounce of lime water, White Rock or Poland water was allowed every four hours; every alternate two hours, a half glass of albumin lemonade was given, or instead, eggnog, barley water, buttermilk, Horlick's malted milk or Valentine's meat juice. In a few days, thoroughly well cooked rice, buttered toast, egg custard, fruit jelly, calves' foot jelly and chicken jelly were allowed. The patient made an uninterrupted recovery on this liberal plan of feeding. The author is firmly convinced that by the liberal allowance of suitable food, terminal infections and general feebleness can be largely prevented, and the patient brought to a stage of convalescence, ready for a speedy return to normal health and activity.

Theoretically, a liberal and varied dietary ought to be of great value in this disease to obviate the waste of tissue arising from the enormous oxidation which is going on. The increased consumption of the albuminoid tissues, and the great amount of "cost of cell protoplasm," demand an abundant supply of material to satisfy the organism and to repair cell protoplasm. The typhoid patient should be well nourished, and the fuel value of the ingesta at the beginning should be between 2,500 and 3,000 calories daily and contain about 70 grams of protein, which should be increased later, as Coleman points out, to from 5,000 to 8,000 calories, if conditions permit. It is important to give carbohydrates freely to spare the body proteins, and this is aided by the addition of milk sugar to the dietary; a teaspoonful may be allowed with each feeding of milk.

Ker(33) advocates a liberal dietary in typhoid, believing that the use of even solid food early in convalescence does much to shorten the duration of the attack. "The liberal supply of food at this period helps to promote the healing process in the ulcerated intestines, and to repair the waste caused by the prolonged pyrexia, and probably prevents such sequel as periostitis, abscesses, and otitis media."

Barrs of Leeds(34) advocates a liberal dietary in typhoid. He said: "No one can fail to be impressed with the extreme emaciation, feebleness, and prolonged disablement which that disorder entails." His custom in

outlining a dietary for his typhoid patients was to include bread and butter, poached eggs, minced meat, bacon, rice pudding, custards, stewed fruit, sponge cake, porridge and milk, etc., for patients whose morning temperature varied from 100° F. to 101° F., with an evening temperature of 101° F. to 102° F. He never urged solid food upon a typhoid patient, but when the patient asked for it, it was given. He does not believe that solid food will exert a deleterious effect, when the patient's appetite and digestion permit him to take such food. When a patient likes a particular food, and has a craving for it, this is a reliable indication that it will not work to his undoing but agree, be digested, absorbed, assimilated, and tend to enhance the well being of the individual. It is Barrs' rule to give a typhoid patient such wholesome solid food as he likes.

Bushuyez(35) gives solid food without fear, and his results have been satisfactory as far as recoveries are concerned. He gave the following dietary during the acute febrile stage:

BUSHUYEZ' DIETARY IN TYPHOID FEVER

Early Breakfast:

Tea, roll and butter.

Breakfast:

Given in three parts: 8 A.M., porridge made of boiled oatmeal, barley, or wheatmeal, 13 fluid ounces; 9 o'clock, two eggs, boiled soft or hard, as the patient likes; 10 o'clock, a cutlet, roll, and tumblerful of milk.

Lunch, 12:30 P.M.:

A breakfast cupful of clear soup or beef tea, and an equal quantity of jelly.

Tea—3 P.M.:

A roll and butter, tea with cream and sugar.

Dinner—6 P.M.:

A cupful of chicken broth or beef tea, breast of chicken, potato purée, milk pudding, or milk to drink; 8 P.M., a roll and butter, milk to drink.

During the Night:

Milk-tea or coffee made with milk, a cupful given twice or thrice.

Stimulants:

Wine (1 to 3 ounces) at 10 or 11 A.M., and a tablespoonful of brandy mixture every two hours.

The above dietary is an extreme example of liberal feeding, with solid food, which we cannot endorse. Bushuyez treated 398 cases on this dietary and had only a few relapses, and four hemorrhages; his mortality was only 8.2 per cent.

Our experience with high-calorie feeding is very satisfactory, the results are marvelously good; the nurse with a little tact will be able in almost all cases to persuade the patient to take the food when prepared;

with definite formulas of known caloric value to the ounce measure, it is possible to know at all times, the exact fuel or energy value of the aliment ingested, even though the nurse or attendant be comparatively inexperienced in such matters.

The following table graphically shows the analysis and caloric values of various foods, which will help the inexperienced nurse in carrying out the physician's instructions for definite caloric food values (page 421):

Roberts(36), in summing up his experience with the high-calorie diets in typhoid fever, says:

Many times it has seemed entirely advisable for the patient to sit up for one-half hour morning and evening and read, even during the second and third week of the disease. The picture is so striking that we are led to wonder whether the disease that we have known as typhoid fever is not, in large measure, really starvation and an intoxication resulting from the breaking down of the body protein or some such process.

We were at first inclined to doubt the possibility of feeding every typhoid patient on this plan of diet. There was indeed a period when we found it impossible. Further experience has taught us that success depends on the proper instruction of nurses, persistence in plying the patient with food, if necessary every two hours day and night, and a variety in the diet suited to the patient's appetite. The very sick will take nourishment readily from the hands of a properly trained nurse. The delirious patient can be fed by due persistence. The patient lacking appetite will usually take some few things with a relish, and these things must be provided. In rare cases where persistent vomiting is encountered early in the disease, we may meet with a serious obstacle. The possible causes of vomiting are many, but no doubt include intoxication which would be avoided by proper feeding in the early stages of the disease.

F. C. Shattuck, M.D.(37) of the Massachusetts General Hospital finds that his experience conforms with that of his colleagues favoring a liberal dietary in typhoid fever. The dietary outlined below is one that Shattuck has prescribed for thirty years and which he recommends as absolutely safe. On careful calculation, it will be seen that the amount of protein, fat and carbohydrate content is about that usually allowed a healthy individual.

SHATTUCK'S DIETARY FOR TYPHOID FEVER

Milk, hot or cold, with or without salt, lime-water, soda-water, Apollinaris, Vichy, or other alkaline waters; peptogenic powder or peptonized milk; milk with whole egg, white of egg, tea, coffee or cocoa.

SUITABLE FOOD FORMULAS FOR HIGH CALORIC FEEDING

FOOD FORMULAS	Ways of Serving	Amount	Carbohydrate in grams	Fat in grams	Protein in grams	Calories	Calories per ounce
1. Milk.....	Hot or cold, or as junket.	8 oz.	12	9.5	8.4	160	20
2. Milk.....	Hot or cold.....	6 "	9	6.5	6	120	...
Cream (40%)...	Flavored with tea or coffee or cocoa. As junket	2 "	1.8	24	1.5	240	45
3. Milk.....	As iced drink.....	6 "	9	6.5	6	120	...
Cream.....	Flavored with tea or coffee or cocoa.....	2 "	1.8	2.4	1.5	240	60
Lactose.....	Flavored with vegetable or meat as soup. Flavored with vanilla or chocolate.....	1 "	30	...	...	120	...
4. Milk.....	To be used as iced drink with brandy or whiskey	6 "	9	6.5	6	120	...
Cream.....		2 "	1.8	2.4	1.5	240	...
Lactose.....	Cooked as custard or made into ice cream (sweetened).....	1 "	30	...	...	120	70
Egg.....	As hot soup flavored as above.....	One	...	5	7	80	...
5. Orange juice....	Preferably ice cold.....	4 oz.	12	...	...	48	12
6. Orange juice....	Served as iced drink or frozen as water ice....	4 "	12	...	...	48	...
Egg.....		One	...	...	...	80	...
Lactose.....		1 oz.	30	...	...	120	30
Vichy or water...		4 "	...	...	...	...	...
7. Cereal (cooked)..		5 "	...	...	...	120	...
Cream.....		2 "	...	...	...	240	...
Lactose.....		1 "	...	...	...	120	65
Cane sugar.....		¼ "	...	...	...	30	...
8. Bread or toast...	Slice 4"x4"x½" thick = 50 gm.....	50 gm.	25	...	5	120	...
9. Milk toast.....	Add steaming milk as desired						
Bread.....		50 "	25	...	5	120	...
Cream.....		2 oz.	1.8	2.4	1.5	240	...
Lactose.....		1 "	30	...	...	120	...
Butter.....	1" cube.....	10 gm.	...	8	...	65	...
10. Baked apple....	Sugar to taste.....	1	18	...	...	75	...
Lactose.....		1 oz.	...	...	...	120	...
Cream.....		1 "	.9	1.2	.7	120	...
11. Jelly.....	Flavored with beef, wine or fruit						
Gelatin, q. s.		1 "	30	...	...	120	...
Lactose.....		1 dr.	8	...	...	15	50
Cane sugar.....		5 oz.	...	...	...	...	...
Water, q. s. ad...		1 "	.9	1.2	.7	120	...
Cream (whipped)		3 "	32	...	3.5	90	...
12. Potato (medium).		10 gm.	...	8	...	65	...
Butter (inch)...							
13. Crackers.....	Each kind must be weighed in fractions of oz.....	3-10	70%	...	...	12-40	120

Soups, made of beef, mutton, veal, chicken, oysters, peas, beans, squash, or tomato; they should be strained and thickened with rice-flour, wheat-flour, barley, arrow-root, eggs, eggs and cream, Horlick's malted milk, or Mellin's food.

Cream, cream and barley water; whey, buttermilk, kumiss, Matzoon.

Beef-juice, bovine, carnipectone, somatose.

Gruel, made of cornmeal or oatmeal and strained, and farinaceous foods.

Eggs, soft boiled, raw, or in eggnog; ice cream.

Meat, scraped or finely minced; the soft part of raw oysters.

Puddings, soft puddings without currants or raisins, macaroni, blanchmange, apple sauce, wine jelly.

Soft crackers with tea, soup, or eggnog; soft toast without crust.

Drink—plain water, barley water, lemon water, albumin water, tea, coffee and cocoa.

The great gain from the liberal or high-calorie diet in typhoid fever is the lessened emaciation, the shortening of convalescence, and the prevention of exhaustion phenomena at the termination of the disease. On a high-calorie dietary, most patients lost from 5 to 10 pounds, though sometimes a patient will come out of bed without loss of weight. In the experience of practitioners who use the liberal method of feeding typhoid patients, *diarrhea* is uncommon, which under the starvation plan was a most troublesome symptom. *Abdominal distention* is not as common with liberal feeding as formerly was the case. *Hemorrhage* is not excited by liberal feeding, and in Coleman's opinion, "If the patient be in good condition, the loss of blood affects him no more than it does a healthy man." *Relapses* in Coleman's experience are only slightly affected by liberal feeding. *Perforation* is not unfavorably influenced by liberal alimentation. "The mortality" (according to Coleman's figures which we quote), "occurring in Bellevue and allied hospitals from 1907 to 1910 inclusive is as follows: There were 102 cases liberally fed with a mortality of 10.7 per cent, there were 773 cases fed otherwise with a death rate of 16.5 per cent. These cases all occurred during the same years and were taken from the same institutions, drawing the same class of society." Sicard (38) reports a mortality of 10 per cent in his series of cases treated at Bellevue Hospital; while Bushuyez reports a mortality of only 8.2 per cent in a series of 398 cases treated on an excessively high calorie diet.

Barker (39) is of the opinion that "since convalescence can be shortened and emaciation prevented, there is good reason to believe that post-typhoidal psychoses and post-typhoidal neurasthenic states will be less common than under the old regimen."

Tympanites was formerly considered a symptom of typhoid, whereas it is now known to be a complication. Its presence means a disturbance

of digestion, with fermentation, which lessens the breathing capacity and hinders free heart action, and possibly increases the danger of hemorrhage and perforation. The old method of feeding milk only was largely responsible for this troublesome complication. The dry coated tongue is also a complication which will clear up by outlining the proper dietetic measures. Eustis(40) reports a series of twelve cases in which he kept the tongue clean by allowing a properly selected dietary. He considers "tympanites due to the putrefaction of protein food," and with a high indican test, he always lessens the protein and increases the carbohydrate content of the dietary, which is easily done by allowing easily digested carbohydrate foods, such as lactose, mush, well boiled rice, cream of asparagus soup, gruels, etc.

It is readily understood that prejudice against liberal alimentation in typhoid fever should be deep seated, especially so if we recall the past history of the starvation plan of dieting in this disease. There are physicians even to-day who consider it criminal to allow a typhoid patient to eat a piece of dry toast, even when it is thoroughly masticated. However, the evidence at the present time favors the liberal feeding of typhoid patients, provided, of course, that the dietary is adapted to the caloric requirements and powers of assimilation of the individual. If the administration of the high-calorie diet is to be successful in every particular, the details of nursing and feeding must be most carefully outlined by the attending physician. The hours and intervals of feeding by day and night, the relations of the food ingested to the amount of water consumed, the quantities taken each time, the variety of and the serving of the food, the estimation and recording of the calories, all require tact and judgment on the part of the physician and nurse.

HYGIENIC CONSIDERATIONS IN TYPHOID.—The care of the mouth in the typhoid patient is a matter of the utmost importance. This subject was referred to by Dr. Kerr in the first section of this chapter, and it has been discussed at length in Volume III, Chapter XXV, but even at the risk of repetition, we again urge the most careful attention to the toilette of the mouth. The mouth should be rinsed after partaking of food, and if the patient is too feeble to do so, the nurse should carefully and gently swab the mouth, using a cotton wrapped probe saturated with an agreeable antiseptic mouth wash. *Acidi carbolici* ʒi. (4 c.c.), *Glycerine* ʒi. (30 c.c.), *Boric acid sat. solu.* ʒx. (300 c.c.); when this is faithfully done, one will seldom see the "brown typhoid tongue" so common in the early eighties.

PREVENTIVE MEASURES.—Preventive typhoid inoculations against typhoid fever began with the work of Pfeiffer and Kalle(41), who inoc-

ulated two persons in 1896. Soon after, Sir Almroth Wright(42) applied the prophylactic inoculation to a number of persons, and in 1898 continued the work on a large scale in some 4,000 soldiers in the British army in India. During the Boer War, he supervised the immunization of 100,000 British troops with the typhoid vaccine. Major Russell, M. C., United States Army(43), advocated typhoid prophylaxis in the army, and in 1909-1910 the preventive inoculations were administered to volunteers. On September 30, 1911, it became compulsory for both officers and men.

During the Spanish-American War, with 107,000 troops in the field, 20,000 came down with typhoid fever. During 1913 there were only two cases in the army with an enlisted force of over 80,000 men; from 1909 to 1914, there has been only one death due to typhoid fever, while the mortality in the country at large has been 16.5 per cent per hundred thousand population. Preventive typhoid inoculations must, therefore, be regarded as a shining triumph of preventive medicine.

The beneficial results of typhoid inoculations can be no longer questioned. No risk whatever is involved, and they are especially urged upon those unduly exposed, as nurses, hospital attendants, physicians, soldiers in camps, and all persons who come in contact with a "typhoid carrier."

REFERENCES

1. GRAVES, R. J. Clinical Lecture on the Practice of Medicine, London, 1884.
2. MULLER, F. Leyden's Handbuch der Ernährungstherapie, 2nd ed., vol. i, p. 213.
3. BENEDICT, H., and SURANYI, N. Die Stoffwechselvorgänge während der Typhus-convalescenz, Ztschr. f. klin. Med., 1903, vol. xlviii, p. 290; vol. xlix, p. 482.
4. EWING, J., and WOLF, C. G. L. The Clinical Significance of the Urinary Nitrogen, vol. iii; Nitrogenous Metabolism in Typhoid Fever, Arch. Int. Med., Oct., 1909, p. 330.
5. GRAFE, E. Zur Frage des Stoff- und Kraftwechsels im Fieber, Deutsch. Arch. f. klin. Med., 1911, vol. cii, p. 213.
6. DU BOIS, EUGENE F. From the Department of Applied Pharmacology, Cornell University Medical College and Second Division of Bellevue Hospital. Arch. Int. Med., Sept., 1912.
7. SHATTUCK, F. C. Diet in Typhoid Fever, J. Am. Med. Assn., July 10, 1897, p. 51.

8. BARKER, L. F. Diet in Typhoid Fever, *Ibid.*, Sept. 12, 1914, p. 929.
9. SICARD, M. H. Further Experience with High Calorie Diet in Typhoid Fever, *Med. Rec.*, March 22, 1913, page 523.
10. COLEMAN, WARREN. The Effect of Food on Metabolism in Typhoid Fever, *J. Am. Med. Assn.*, Sept. 12, 1914.
11. CROHN, B. B. Experiences with the Coleman Diet in Typhoid Fever, *Ibid.*, Jan. 27, 1912.
12. BARRS, A. G. A. Plea for a Less Restricted Diet in Typhoid Fever, *Brit. Med. J.*, 1897, vol. i, p. 125.
13. SHATTUCK, F. G. Diet in Typhoid Fever, *J. Am. Med. Assn.*, July 10, 1897, p. 51.
14. BARRS, A. G. *Loc. cit.*
15. COLEMAN, WARREN. The High Calorie Diet in Typhoid Fever: A Study of 111 Cases, *Am. J. Med. Sci.*, 1912, New Series, vol. cxliii, p. 77; Five Years' Experience with High Calorie Diet in Typhoid Fever, *J. Am. Med. Assn.*, Aug. 3, 1912, p. 363.
16. ———. The Effects of Food on Metabolism in Typhoid Fever. Read at Atlantic City, Meeting of Am. Med. Assn., and published in *J. Am. Med. Assn.*, Sept. 12, 1914.
17. SHAFFER, P. A., and COLEMAN, W. Protein Metabolism in Typhoid Fever, *Arch. Int. Med.*, Dec., 1909, p. 538.
18. DU BOIS, E. F. The Absorption of Food in Typhoid Fever, *Arch. Int. Med.*, Sept., 1912, p. 177.
19. VON HOESSLIN, H. *Arch. f. Path. Anat.*, 1882, vol. lxxxix, 95, 303.
20. KOCHER, R. A. Ueber die Grösse des Eiweisszerfalls bei Fieber und bei Arbeitsleistung, *Deutsch. Arch. f. klin. Med.*, 1914, vol. cxv, p. 82.
21. SHAFFER, P. A., and COLEMAN, W. Protein Metabolism in Typhoid Fever, *Arch. Int. Med.*, Dec., 1909, p. 538.
22. DU BOIS, E. F. The Absorption of Food in Typhoid Fever, *Ibid.*, Sept., 1912, p. 177.
23. COLEMAN. *Amer. J. Med. Sci.*, Jan., 1912.
24. SCHOTTMÜLLER, H. Die Typhosen Erkrankungen, Mohr und Staehlin's Handbuch der Innere Medizin, 1911, vol. i, p. 504.
25. SICARD, M. H. Further Experience with the High Calorie Diet in Typhoid Fever, *Med. Rec.*, March 22, 1913, p. 523.
26. KINNICUTT. *Boston Med. and Surg. J.*, 1911.
27. COLEMAN. High Calorie Diet in Typhoid Fever, A Study of 111 Cases, *Am. J. Med. Sci.*, 1911,

28. SHAFFER. Am. J. Physiol., 1905, p. 66.
29. BUSHUYEZ. Quoted by Tibbles, Food in Health and Disease; *see also* Sutherland's System of Diet and Dietetics.
30. ROLLAND. Deutsch. Arch. f. klin. Med., 1912, vol. cvii, p. 440.
31. SHAFFER, P. A., and COLEMAN, W. Protein Metabolism in Typhoid Fever, Arch. Int. Med., Dec., 1909, p. 538.
32. OSLER, SIR WILLIAM. (Regius Professor of Medicine, Oxford University, London.) The Principles and Practice of Medicine, pub. by D. Appleton & Co., New York.
33. KER. Sutherlands' System of Dietetics, p. 324.
34. BARRS, A. G. Virchow's Archives, 1897, vol. lxxxix, pp. 106-109.
35. BUSHUYEZ. Quoted by Tibbles, Food in Health and Disease.
36. ROBERTS, DUDLEY, M.D. High Caloric Feeding in Typhoid Fever, N. Y. Med. J., Jan. 27, 1917.
37. SHATTUCK, F. C. Am. J. Med. Sci., May, 1909.
38. SICARD. Med. Rec., March 22, 1913.
39. BARKER, LEWELYS F. Diet in Typhoid Fever, J. Am. Med. Assn., Sept. 12, 1914.
40. EUSTIS, ALLEC, C. (New Orleans.) *Ibid.*, vol. lxiii, No. 11, p. 935.
41. PFEIFFER and KALLE. Deutsch. med. Wochenschr., 1896, vol. xxii, p. 735.
42. WRIGHT, SIR ALMROTH. (London.) Lancet, Sept. 19, 1896.
43. RUSSELL, MAJ. J. J. J. Am. Med. Assn., Aug. 30, 1913.

Typhus Fever.—Typhus fever, known also as *hospital fever*, *camp fever*, *ship fever*, *jail fever*, *spotted fever*, and in Germany as *exanthematic typhus*, in contradistinction from *abdominal typhus*, is an acute infectious self-limited disease of sudden onset, characterized by fever, mental apathy, and the development of a maculated rash which does not recur, as does the "rose rash" of typhoid fever. Marked nervous symptoms are particularly noticeable. This malady is peculiarly prone to attack large numbers of the lower classes in unhealthy localities, but it also takes its toll of victims from the top cream of the social level. The period of incubation varies from eight to fourteen days, but cases have been known to develop in seven days after exposure.

The relatively recent experiments of Nicolle(1), Ricketts and Wilder(2), Anderson and Goldberger(3), revealing the manner in which typhus fever is borne from patient to patient by lice, and the later investigations of Anderson and Goldberger, proving the identity of Brill's(4) disease with typhus fever, aroused new interest in this disease. The

discovery that typhus is an insect-borne disease lends strength to the protozoan theory of its etiology, because of analogy with such insect-borne infections as malaria, sleeping sickness, kala-azar, and relapsing fever.

More recently, Plotz(5) isolated a small anaerobic gram positive bacillus from the blood of a series of cases of Brill's disease, which when used as an antigen, caused fixation of complement with the sera of these cases. The injection of cultures of Plotz' bacillus into guinea pigs resulted after an incubation period of twenty-four to forty-eight hours in a high febrile reaction, which dropped by lysis after five or six days.

In June, 1915, Plotz and his associates¹, at the invitation of the Austrian Government, undertook to stamp out typhus fever in certain of the Balkan States, using a vaccine which consisted of a suspension of 15 strains of *B. typhi exanthematici*. In all, 8,420 persons, members of 109 hospitals, sanitation and other units in Serbia, Bulgaria and Volhynia, were vaccinated against typhus fever during the epidemic of 1915-1916. Of this number, six developed the disease during the four months of the epidemic. Results obtained in the Balkans and Volhynia would seem to indicate that the vaccine is capable of reducing the incidence of the disease, although it does not produce an absolute immunity to typhus fever.

In the experience of Hall(6) the use of the immunizing vaccine taken from the attenuated strain of the bacillus found in Brill's disease has not been of any material service as a curative antitoxin.

The symptoms of typhus fever are quite characteristic. Unlike typhoid, the invasion is usually abrupt. The eruption appears in from three to five days, first upon the abdomen and chest, and rapidly spreading to the arms and legs. The eruption is papular like the rose rash of typhoid, but the spots are not as rosy as in typhoid, and finally become dark petechiae. There appears to be a subcuticular eruption or area of congestion underneath the papule, giving a marbled or mottled appearance.

It must always be borne in mind that typhus fever is essentially a filth disease, and that destitution also plays a prominent part in its causation. Its germ origin has apparently been established, but at the

¹ This work was carried out under the auspices of the American Red Cross. The expenses of the expedition were defrayed by directors of the Mount Sinai Hospital. Two of the authors (Plotz and Baehr) took part in the European expedition, both at first working together in the Balkans, but later independently, one in Serbia and Bulgaria, the other in Volhynia and Galicia. Drs. Olitsky, Denzer and Poll were responsible for the preparation of much of the vaccine, the former two subsequently taking part in a second expedition to Mexico.

same time, as Hall and others have shown, wherever the ordinary laws of hygiene have been transgressed by a segregation of people, whether through the exigencies of war and famine, or through shiftlessness and primitive ignorance, typhus fever epidemics have been the penalty. In the old days, in European countries, when food was scarce and sanitary science still in its swaddling clothes, typhus fever was a frequent disease. The malady was common in parts of Great Britain, especially in Ireland, some hundred years ago, when the inhabitants were often in a wretchedly ill nourished condition and existed in squalor and dirt. The names given to it, jail fever, camp fever, and ship fever, sufficiently indicate that it was to a large extent a disease of dirt and malnutrition. Indeed, it came within the category of pellagra as a "mal de misère."

In the olden times, that is comparatively speaking, the difficulty of providing an adequate amount of nourishing food constituted one of the main causes why typhus so often broke out in armies in the field and in besieged garrisons. Up to the time of the war in Europe, the existence of typhus had been almost forgotten, but under the conditions prevailing in some of the battle grounds, notably in Serbia, the soil was ready for an outbreak. It is not surprising that typhus appeared and raged virulently. The commissariat of Serbia was notoriously defective, and from the standpoint of inadequate and innutritious food supply, a badly nourished population provided an ample field for the pest to spread and flourish in. Neither dirt alone nor lack of suitable food alone brings about the disease. It is a germ disease and the germ is conveyed, according to the testimony of those who have had experience with epidemics, by the agency of vermin, for instance, body lice, head lice and bed bugs, most often the former. Body lice do not occur, at any rate not in large numbers, in countries where good hygienic conditions prevail. Filth and dirt, by reason of permitting the existence of this vermin, are in the first place responsible for the spread of typhus.

A fever of this nature is not likely to obtain a firm hold unless the human beings attacked by infected vermin are devitalized by destitution. When these three causative factors or rather conveying agents are present at the same time, it may be assumed that typhus will spread like wild fire. Serbia affords one example that such is indeed the case, and Mexico is another example. In order to arrest the spread of an epidemic and to stamp it out, efficient sanitary measures must therefore be rigidly enforced, including as a matter of course, the destruction of vermin.

DIET IN TYPHUS FEVER.—Another important preventive and curative measure is one, the discussion of which falls well within the scope

of a work on diet, namely, the supplying of good food to the population within a threatened or infected area. Diet then is a factor of no mean service, in both the prevention and successful treatment of typhus fever.

R. O. Moon(7) advocates hydrotherapy as one of the best methods of reducing the pyrexia and soothing the nervous system. As for diet in treatment, he is of the opinion that the principles to be observed are the same as in all the specific fevers, except enteric fever, which owing to the ulceration of the intestine has special rules of its own. The diet should be mainly milk, rendered more palatable perhaps by the addition of some mineral water. This in many cases is all that is necessary; often it may be advisable to give in addition, eggs, soup, or beef tea.

There is no absolute objection to giving solid food if the patient's mental condition is such as to admit of his swallowing it, but as a rule he is better without it until his temperature becomes normal. After that, solid food can always be given at once; the patient may have a ravenous appetite, and there is no objection to its being gratified. The supporting treatment is now generally adopted as a method of treating fevers, and in the case of typhus, which is a most devitalizing disease, this seems perfectly sound policy. The old way of treating typhus fever involved the administration of a good deal of alcohol, but only when symptoms urgently call for a stimulating form of treatment should spirits be employed. In an ordinary way, alcohol is not indicated.

In the author's opinion, the dietetic treatment of typhus fever should be much the same as that of typhoid fever, but as there are no lesions in the intestinal canal, the extreme care of the alimentary tract as in typhoid is less imperative. The patient should be isolated, of course, and provided with an abundance of light, air and pure water. In the early stages with high fever and delirium, an ice cap to the head and bromids are indicated. Egg albumin water should be given even if it has to be put into the stomach through a tube by way of the nose. As already pointed out, there is no malady where these aids to health are more essential to recovery. The course of this disease is towards profound asthenia, therefore easily assimilated or pre-digested foods should be given as freely as the patient can metabolize and utilize them. The patient's strength requires attention from the beginning. It is necessary, therefore, to furnish the proper amount of easily digested and assimilated nourishment, and nothing accomplishes this more satisfactorily than the milk dietary described in the dietetic treatment of typhoid fever. It has been shown that the digestive processes go on more perfectly when patients are fed sparingly at regular and frequent intervals.

The duration of the fever is shorter than that of typhoid, and some of the objections to the milk dietary are, therefore, less apt to arise. Milk to which has been added pepsin or pancreatin, and sodium bicarbonate, should be given in two ounce feedings every two hours. Barley water, rice gruel, boiled rice, eggs soft boiled, broths, buttermilk, kumiss, etc., may be allowed; custards, raw eggs—eggnog and milk shakes, may also be given. Abundant draughts of water should be urged to aid in the elimination of poisons.

Asthenic symptoms and stupor may be counteracted by liberal draughts of strong black coffee or alcohol, whiskey or brandy. The high fever may be controlled by repeated cold sponging of the body surface, and a continuous cold pack to the head will make the patient more comfortable. In cases terminating by crisis, the convalescence begins with a sudden drop of the temperature, and the patient, utterly exhausted, prostrated and emaciated from loss of weight, has the most ravenous desire for food and drink. In such cases, liberal amounts of milk, eggs, rice, etc., are indicated, as outlined in the dietetic treatment of typhoid fever.

Coal tar antipyretics should not be administered if their use can be avoided. The bowels should be kept open by means of gentle laxatives. The activity of the kidneys must be carefully watched and renal function maintained by the free administration of pure water, and by giving sweet spirit of nitre to counteract retention of the urine.

REFERENCES

1. NICOLLE, COMPTE, and CONSEIL. Transmission Experimental du Typhus Exanthématique par le Pou du Corps, *Compt. Rend. Acad. d. Sc.*, 1909, p. 149.
2. RICKETTS and WILDER. The Transmission of the Typhus Fever of Mexico (Tabardillo) by Means of the Louse (*Pediculus Vestimenti*), *J. Am. Med. Assn.*, 1910, vol. xiv, p. 1304; The Etiology of the Typhus Fever (Tabardillo) of Mexico City, *Ibid.*, 1910, vol. liv, p. 1373.
3. ANDERSON and GOLDBERGER. On the Infectivity of Tabardillo, or Mexican Typhus, for Monkeys, and Studies on Its Mode of Transmission, *Pub. Health Rep.*, 1909, vol. xxiv, p. 1941; On the Etiology of Tabardillo or Mexican Typhus, *J. Med. Research*, 1910, vol. xii, p. 409; The Relation of So-called Brill's Disease to Typhus, *Pub. Health Rep.*, 1912, vol. xxvii, p. 149.

4. BRILL, NATHAN E. An Acute Infectious Disease of Unknown Origin, *Am. J. Med. Sci.*, April, 1910.
 5. PLOTZ, HARRY. (Of the Pathological Laboratory of the Mount Sinai Hospital, New York.) *J. Am. Med. Assn.*, May 16, 1916, p. 1556.
 6. HALL, HORACE C. (First Lieut. Med. Res. Corps, U. S. A.) Typhus Fever, *Mil. Surgeon*, Nov., 1916.
 7. MOON, R. O. Typhus Fever in Serbia, *Lancet*, June 10, 1916.
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SECTION VI

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General Considerations: Relation of Diet to Metabolic Principles.

Diet in Infectious Diseases (*continued*): Acute Bacillary Dysentery;
Amebic Dysentery; Paratyphoid Fever.

GENERAL CONSIDERATIONS

The problem of furnishing a proper diet, difficult in health, becomes more difficult in disease. For during most diseases, tissues are destroyed at a much more rapid rate than in health, while the body is frequently rendered incapable of digesting and assimilating the foods ordinarily used. Fortunately, the human organism possesses a very large metabolic factor of safety, as shown by the fact that it has been able to sustain fasts of thirty, forty or even sixty days. Manifestly, if a disease like dysentery lasts but a few days or even a week or two, the patient may survive on almost any diet that is not mechanically fatal.

Relation of Diet to Metabolic Principles.—In order to prescribe diet in different diseases in accordance with scientific principles, we should know the difference in metabolism in those diseases from that of health, and also the pathological processes in the alimentary tract and other parts of the body that may partly or entirely prevent the digestion and assimilation of particular foodstuffs.

Pathological anatomy has very creditably supplied the information required under the second head, but the investigation of the actual meta-

bolic processes in disease has only just begun with careful calorimetric studies of patients suffering from various diseases.

Until accurate information has been accumulated by such studies of the actual metabolic process in each disease, the physician called upon to prescribe a diet for a given disease, should at least have a clear idea of the diet required to maintain the metabolic balance in health, together with a knowledge of the pathologic changes in any disease that necessitate modifications of a diet suitable in health.

The diet in health should furnish the elements necessary for the proper repair of the tissues, together with a sufficient amount of fuel to develop the required amount of energy. If the ration is properly balanced, and supplied in adequate but not excessive quantity, these aims will be attained with physiologic efficiency.

The following table presents one estimate of the daily caloric requirements of a man weighing 156 pounds (70 kilos):

	Calories
1. Absolute rest in bed without food.....	1,680
2. Absolute rest in bed with food.....	1,840
3. Rest in bed eight hours, sitting in chair 14 hours, with food.....	2,168
4. Rest in bed eight hours, sitting in chair 14 hours, walking two hours, with food (professional men, clerks, etc.).....	2,488
5. Rest in bed eight hours, sitting in chair 14 hours, vigorous exercise two hours, with food.....	2,922

From this table, we see that a patient in hospital will require a minimum of 1,840 calories if the diet is to maintain the metabolic balance. When not confined to bed, he will require a minimum of 2,168 calories. These estimates do not take into account any unusual demands made because of the increased wear and tear caused by the disease process. The fuel to furnish the required energy may be derived from the consumption of proteins, fats, or carbohydrates.

Protein is not an economical fuel, and the desirable amount is therefore that which will replace daily wear and tear, while the remaining energy requirements should be supplied by the combustion of fats and carbohydrates. Various authorities have estimated this amount very differently even in health, ranging from 0.94 grams of protein per kilo of body weight to 2.0 grams. Voit's classical estimate was 118 grams of protein furnishing 483 calories. Chittenden thought this estimate of the amount of protein required excessive and recommended 60 grams of protein furnishing 246 calories.

It appears to the writer that Chittenden's estimate of the protein

requirement is altogether too low for ordinary hospital use, for the following reasons: It is probably an irreducible minimum even for healthy men, and should catabolism be accelerated as in illness, the supply of protein would be insufficient; the bodily requirement, moreover, does not depend upon protein, but on useful protein; a complete protein contains about 17 amino acids, and, while most animal proteins are complete, many vegetable proteins are not. Depending upon the variety of protein furnished, it may accordingly become necessary to consume several times the amount of protein actually catabolized in order to obtain sufficient useful protein. As we cannot consult a chemist every day with regard to the amino acid components of various proteins, we must consume as a factor of safety somewhat more than is perhaps absolutely required.

DIET IN ACUTE INFECTIOUS DISEASES (*Continued*)

Acute Bacillary Dysentery.—Acute bacillary dysentery is essentially a very intense toxemia caused by infection with one of the varieties of the *B. dysenteriae*. These bacilli multiply along the whole length of the intestine, giving rise to toxic products which are absorbed into the blood. Part of these toxic products are believed to be excreted by the large intestine, thereby causing the typical lesions of this disease and the characteristic bloody flux. Other toxic products circulate in the blood and cause the fever and other general symptoms of intoxication, and appear to have a selective action on the nervous system, often causing a peripheral neuritis.

The stomach and small intestine are practically normal, although the latter may be slightly hyperemic, but the mucous membrane of the large intestine through which the toxin is excreted, may exhibit any degree of inflammation, from a simple hyperemia to a superficial ulceration or a gangrenous slough. The mucosa is usually covered with an exudate which forms a false membrane. Ulceration may proceed more deeply into the coats of the bowel, causing perforation and peritonitis, though this is very unusual. Ordinarily, the inflammation is superficial and involves chiefly the mucosa. Death when it occurs is usually a matter of days, and convalescence may begin in a week or two depending upon the severity of the infection.

DIET IN BACILLARY DYSENTERY.—The indications for outlining a diet are obvious. The stomach and small intestine are able to perform their customary functions, but the large intestine requires a complete

rest. Therefore any food that produces a residue is to be avoided, at least in the acute stages. The disease is self-limited, probably only of short duration, and the bedridden patient expends a minimum of energy. Every well nourished adult possesses certain food reserves, and a complete fast of a few days probably does not constitute a severe drain upon robust individuals. In accordance with these facts, when dealing with such adults, it may not be injurious to prohibit all food except water for several days during the most acute stage of the disease, and this course is frequently taken by physicians. A fast has the advantages of giving the intestine a complete rest, and of not interfering with any treatment given by mouth, such as bismuth or the salines.

At the same time, it must be remembered that patients with acute dysentery can seldom lie quietly, but are much disturbed by constant evacuations, thereby expending more energy than most bed patients. Furthermore, dysentery is a disease of a nature profoundly weakening and exhausting. With the exception of cholera, probably no other disease will turn a robust man into a shadow of his former self more quickly than acute dysentery. Debilitated individuals and young children, moreover, do not possess the food reserves of robust adults. The fatalities in dysentery occur largely among the very young and the very old. The mere act of eating supplies a stimulus entirely apart from any nutritional value which the food may possess after digestion. An exhausted laborer is refreshed and enabled to continue work after a hot meal, although it is certain that little or none of the food ingested can be immediately available. For all these reasons, it is desirable to begin feeding at the earliest practicable moment.

Naturally the diet must be liquid and not leave much residue. It should be given in small quantities, say about five ounces every two hours. It should be neither cold nor very hot, for hot drinks stimulate peristalsis, and are to be taken very slowly. Can we construct a balanced diet along these lines that will afford about 2,000 calories, approximately the amount required for the average adult bed patient? It must be admitted that this is difficult, nor is it strictly necessary in a disease of such short duration.

A very widely used book on tropical medicine suggests that the diet in the acute stages should be restricted to whey and albumin water. Let us suppose that four ounces are to be given every two hours between the hours of 6 A.M. and 10 P.M. This would be nine feedings with a total of 36 ounces. Further let us suppose that one ounce of egg white is dissolved in three ounces of whey at each feeding. The whole 27

ounces of whey will furnish approximately 205 calories (protein 15 per cent, fat 10 per cent, carbohydrate 75 per cent), while the nine ounces of egg white will furnish approximately 140 calories (protein 100 per cent). Therefore a total of only 345 calories will be supplied in this diet, in which, moreover, the protein element is proportionately in great excess. How may this diet be modified to correct the proportion of the food elements and furnish more nearly the number of calories required? Here as in other cases in prescribing a diet, a study of standard dietary tables showing the food value of various articles will be found of the utmost value.

Almost all individuals use either coffee or tea habitually, and miss them when they are cut out of the diet. It is desirable to secure the stimulating effect of these beverages, and a considerable number of calories are furnished in the sugar and cream used. One ounce of cream furnishes approximately 60 calories (protein 5 per cent, fat 86 per cent, carbohydrate 9 per cent). Two teaspoonfuls of granulated sugar furnish about 50 calories (100 per cent carbohydrate). Therefore, by giving two cups of coffee or tea with sugar and cream during the day, in addition to the outlined diet of albumin water and whey, a total of 565 calories will be furnished, and the deficiency in fats be corrected. Much of the remaining caloric deficiency may be made up by the addition of carbohydrate, preferably in the form of milk sugar or glucose. These sugars have the advantage of being readily assimilated and therefore furnish the required amount of energy with the greatest ease; moreover, as they are not very sweet, they are not cloying to the palate. One-half an ounce of either of these sugars can be added to each feeding without making the mixture unpleasantly sweet, and as half an ounce of sugar furnishes about 60 calories, approximately 540 calories will thereby be added to the diet already outlined, making a total of 1,105 calories.

Such a diet leaves much to be desired. It is still short 575 calories of the requirements for the minimum basal metabolism (1,680 calories), though this might be corrected by increasing the amounts at each feeding. Patients will quickly tire of it, but it is only necessary to use such a diet during the first few days of the most acute cases. In milder cases, and as improvement takes place in serious cases, many additions may be made. Milk may be substituted for the whey, and although it produces a considerable residue for the large intestine to handle, many subacute cases have been fed chiefly on milk. If the milk is diluted with soda, lime water, or barley water, and sipped slowly, the tendency to form large indigestible curds is counteracted. Starches may be added in the form

of arrowroot or cornstarch, and a boiled cornstarch custard affords a palatable combination of milk, egg, and starch. Broths and light strained soups are added, and as convalescence progresses, coddled eggs, toast, chocolate, chicken, fish, etc. The rate at which such foods are added and the particular foods chosen depend so much upon the idiosyncrasies of the patient and the individual judgment of the attending physician, that it is useless to particularize further than to say that some such diet as the following may be gradually worked up to:

DIETARY FOR DYSENTERICS

Breakfast—8 A.M.

One or more of the following:

Hot milk toast or dry toast; lightly cooked egg—coddled; small piece boiled sole or other white fish; a little fresh butter on “pulled” bread; 1 cup chocolate with sugar and cream.

Lunch—11 A.M.

1 cup chicken broth; slice of the breast of fowl, or a piece of boiled white fish; a few buds of well cooked cauliflower; milk pudding or cup custard.

Tea—3 P.M.

Cornstarch pudding and a glass of milk and a rusk.

Dinner—6 P.M.

1 cup light strained soup or broth; a piece of the white meat of chicken, or white fish; small quantity of well cooked rice (dry) and a small piece of butter; arrowroot pudding and a cup of hot chocolate with sugar and cream.

Supper—8 P.M.

One glass hot milk; rusk.

The patient should be directed to chew all food very finely, and to swallow no tough, lumpy or fibrous food. Fruits are indigestible, especially eaten raw, and are forbidden until recovery is complete. Even fruit juices are best avoided at first, as they stimulate increased peristalsis, but during convalescence orange juice, grape juice, and lemonade may be used, cautiously at first and in increasing quantities as they are found to be harmless. Convalescence is apt to be slow, and for a considerable time any indiscretion in diet is likely to cause trouble, so that the ordinary diet should be resumed very slowly and cautiously.

Amebic Dysentery.—A few years ago an elaborate outline of the dietary management of this disease would have been appropriate, but the introduction of the emetin treatment has brought a radical change, and the diet now plays a relatively small rôle in the treatment.

The malady was formerly exceedingly chronic, always lasting weeks or months and frequently continuing over years, leading to most extensive ulceration and scarring of the large intestine. Rest in bed with a liquid

diet was usually considered essential in the more acute stages, but as such diets are usually deficient in both quality and quantity, it is not surprising that Manson says, "In obstinate chronic dysentery, it is often a good thing to change the diet from slops to solids, from a meagre to a more liberal one." In any case, a diet regulated with exceeding care was necessary for months or years in order to avoid anything that would cause a relapse, a misfortune that almost certainly followed any indiscretion in diet, and occurred only too frequently no matter how carefully the diet was regulated.

At the present day, when the disease is recognized by the demonstration of *Entameba histolytica* in the stools, emetin hydrochlorid in hypodermatic doses aggregating one grain daily, will immediately relieve the dysenteric symptoms in the vast majority of cases. In the course of three or four days of such treatment, blood and mucus will entirely disappear and the patient is apparently well, passing formed stools even though he has continued his usual diet throughout the course of the treatment.

DIET IN AMEBIC DYSENTERY.—On theoretical grounds, it is believed that better results could be obtained if amebic patients were confined to bed for a few days on a liquid diet, so that the emetin treatment as outlined above could be combined with massive doses of bismuth subnitrate, the treatment first recommended by Deeks, or with ipecac internally, or with the new treatment by means of emetin bismuth iodid.

Practically, it is difficult to find patients who willingly submit to such restrictions now that they are no longer essential to a clinical cure. Assuming, therefore, that the patient is to be up and about and is to receive a proper course of emetin treatment, he may continue practically on his usual diet, though he should be instructed to avoid especially indigestible articles such as raw fruits, fried foods, shellfish, pastries, coarse vegetables, nuts, pickles, etc. He should also be cautioned to eat slowly and chew his food finely, and these simple precautions may well be continued indefinitely.

Patients treated in this manner are sometimes definitely cured; that is, they have been kept under observation for several years and the dysentery has not recurred. More often, however, a relapse occurs after an interval of several months. While this relapse may have been precipitated by an indiscretion in diet, this is, of course, not the real cause. Some of the amebae have survived the emetin treatment, have multiplied in the tissues, and thus caused a new attack of dysentery, which would probably have occurred even had the most meticulous care been observed in regulating the diet.

These relapses yield to emetin treatment quite as readily as do the original attacks, but the fact that they may be expected to occur in a considerable percentage of cases, is an argument for greater care in treating the disease in the first place. Patients may, therefore, be advised to remain in bed for a few days on a small liquid diet, in order that one of the treatments referred to above may be carried out.

BISMUTH TREATMENT.—The bismuth treatment is administered in conjunction with a course of emetin injections, and may be readily combined with a milk diet. A good sized teaspoonful of bismuth subnitrate is mixed with about six ounces of milk and administered every two hours, the object being to obtain the greatest possible admixture of bismuth in the fecal mass in the large intestine. The bismuth certainly exerts a deleterious action on the amebae in the intestine, which is more intense the higher the percentage of bismuth in the feces. Hence, while the bismuth treatment can be given to patients on a light diet, the best results are obtained on a liquid diet. On this diet the fecal residue will be relatively small and the proportion of bismuth very high. The longer this bismuth treatment is continued, the greater the probability of eradicating all amebae and thus effecting a permanent cure. But patients can hardly be expected to submit to the liquid diet for more than a week or two at the most, after which various articles of light diet that do not cause a bulky residue may be added, including the sugars, starches, baked or boiled potatoes, eggs, custards, chicken, fish, etc. By consulting standard dietary tables,¹ a very liberal and well balanced diet can be readily constructed from such articles as leave little residue to be eliminated by the intestine, and the bismuth treatment may be continued with such a diet as long as appears desirable.

IPECAC TREATMENT.—In the ipecac treatment, about sixty grains of powdered ipecac in salol-coated capsules is usually administered on an empty stomach. As the purpose is to avoid the nausea produced by gastric irritation, the drug could probably be better administered by the duodenal tube. As the medical treatment of dysentery is here considered only in so far as it bears upon the dietetic requirements, it seems unnecessary to enter into further details. During the ipecac treatment, the patient manifests no interest in any diet. It is a most unpleasant treatment, and has not been used very extensively since the introduction of emetin, whereas prior to the use of emetin it was the most effective treatment for amebic dysentery.

¹ See Volume II, Chapter X.

EMETIN BISMUTH IODID TREATMENT.—This drug has been given in one grain doses twice or three times daily in keratin-coated capsules, and the treatment is continued until thirty-six grains have been taken. In most cases the drug causes a good deal of vomiting, irrespective of the method of administration or character of the diet. A method recommended as giving the least annoyance to the patient is as follows: One tablet twenty minutes after a cup of cocoa at 10 A.M., a second tablet twenty minutes after a cup of tea at 4 P.M., and a third tablet twenty minutes after a cup of cocoa at 8 P.M. Patients may receive an ordinary diet during this treatment, and when the drug is given at these intervals, they may be able to retain breakfast and dinner. The amount of vomiting caused by emetin bismuth iodid varies greatly in different patients, but sufficient food may usually be retained to provide the essential requirements of the body so that the treatment need not be interrupted.

Paratyphoid Fever.—Paratyphoid fever is caused by an infection with the *B. paratyphosus*, of which there are two types, A. and B. In its clinical and pathological manifestations, the disease so closely resembles typhoid fever that it is usually impossible to make the diagnosis except by isolating and identifying the offending organism. This being the case, it follows that the diet to be prescribed in this condition, is governed by the same considerations and is practically identical with that called for in a case of typhoid fever. As this subject has been discussed fully in the foregoing section of this work, it is unnecessary to enter into details. The requirements are a diet sufficiently generous to furnish the protein elements of repair to tissues that are being torn down at an abnormal rate, and to supply a sufficient amount of energy without embarrassing the small intestine, which is certainly diseased and sometimes ulcerated.

The writer cannot refrain from commenting on the superstition that regarded milk alone as a suitable diet for this condition. Many a typhoid patient has been slowly starved on a glass of milk every two hours, a diet insufficient in both quantity and quality to maintain the metabolism in a normal individual, to say nothing of supplying the increased demand made by the inroads of the disease. If six ounces of milk be given every two hours for ten feedings, 1,800 c.c. of milk will be taken, and as a liter of milk furnishes only approximately 700 calories, a total of 1,260 calories will be afforded by this diet. As the minimum requirement in such a disease may be set at about 2,000 calories, we see at a glance why typhoid patients on such a diet become thin and emaciated to an extreme degree.

DIET IN PARATYPHOID FEVER.—There are many foods that throw no more burden upon the small intestine than milk, and which may, therefore, be judiciously added to a milk diet without doing any mechanical damage. Such foods include the sugars whose great value as energy producers has already been emphasized, and which are often advantageously given with grape juice or orange juice. White of egg or even the whole egg may be beaten up in a glass of milk. Starches are chiefly digested in the small intestine, but so is milk for that matter, and it is difficult to understand why a properly cooked cornstarch pudding should cause any more embarrassment to the small intestine than milk. Gelatin preparations and meat jellies are also suitable in many cases.

Each case presents its own difficulties, and, moreover, a diet that is excellent in the first week or two of the disease might prove too bulky later on during the stage of ulceration. But as paratyphoid, like typhoid, is a long debilitating illness, it follows that the physician must use the greatest care in selecting a diet sufficiently generous to afford at least the energy requirements of the basal metabolism of the patient. A food shortage that would be immaterial in a short illness may well prove serious under these conditions.

In a discussion of these diseases, no attempt has been made to outline formal diets to fit each condition. Individual cases differ greatly in their ability to digest and utilize certain foods. The amount of sugar which was suggested as an addition to a liquid diet might be of the greatest benefit to one patient, while causing gastric derangement in the next. Instead of a slavish adherence to a particular diet which teaching or experience has proclaimed as suitable for a given disease, the physician should be trained to prescribe diet with the same care as drugs. He should be required to be equally familiar with the principles of nutrition as with the principles of therapeutics. To this knowledge should be added a comprehension of the pathologic processes of the disease in question, and of the individual peculiarities of his patient. Since the outlining of a specific diet would be of no value to a man so equipped, the only purpose of this article is to indicate the method of approaching the problem of the dietary treatment of the diseases discussed.

SECTION VII

EDWARD C. REGISTER, M.D.

Diet in Infectious Diseases (*continued*): Actinomycosis; Erysipelas; Hydrophobia; Influenza; Parotitis; Pyemia; Rheumatic Fever; Septicemia; Tetanus.

DIET IN INFECTIOUS DISEASES (*Continued*)

Actinomycosis.—This is a disease of comparatively rare occurrence in the United States. There is no recorded evidence to show that the infection is transmitted by articles of diet, but cases have been reported where the infection could be traced to the handling of barley-sheaths, to grain chewed raw, and to the carrying of barley straw in the mouth. The mammary gland, both in women and in cows, may be infected. So far no case has been traced to infected milk(1).

DIET IN ACTINOMYCOSIS.—The diet in actinomycosis needs no special consideration. It should be wholesome and nourishing. Eggs in any form are recommended. Soups and broths, if acceptable to the patient, are very good. Fish, steak, mutton chops, and meats of that kind are quite appropriate. It is advisable to give three or four glasses of sweet milk during the twenty-four hours to adult patients suffering from this disease. The patient should be kept well nourished as far as consistent with his digestion.

Erysipelas.—Erysipelas is one of the infectious diseases in which water is of the greatest importance, (*a*) to dilute noxious material, and (*b*) to aid in hastening its rapid elimination from the system through the kidneys. If, for any reason, sufficient liquids cannot be administered by the mouth, saline solutions should be given either by proctoclysis or hypodermoclysis. Albuminuria is common, even in mild cases of erysipelas, and nephritis, although of less frequent occurrence, is sometimes observed. This troublesome complication is due in part to the toxins generated by the streptococci which produce the disease, and in part to the products of fermentation in the gastro-intestinal tract, as in scarlet fever. Therefore, as in the latter disease, the first step in treatment is the thorough emptying of the alimentary canal, and the giving of a bland milk diet, or one from which very little irritating or poisonous matter will be generated. These complications can be prevented, or at least mitigated, by maintaining good elimination through the kidneys which is augmented by a

free allowance of water and milk. All infectious fever patients who run a high temperature should be given a strictly liquid diet during the active febrile stage of the disease. Solid foods should be avoided.

DIET IN ERYSIPELAS.—In erysipelas, six ounces of sweet milk given every four hours while the patient is awake, is sufficient nourishment for an adult when the temperature is above one hundred. If sweet milk is not acceptable to the patient, the same amount of buttermilk is recommended. Chicken broth, mutton broth, beef broth, or oyster broth, a cup every three or four hours for an adult patient, is appropriate nourishment. Patients suffering from this type of infectious fever should be provided with a great deal of water unless it produces nausea. If a patient drinks a glass of milk or water every two or three hours during the twenty-four, and relishes it, he will certainly be improved by its intake. A patient may not be well enough to think about drinking the necessary amount of water. In this event the nurse or attendant should remind him.

On several occasions the writer has found that the articles of nourishment above referred to are not acceptable to the patient. I have substituted panopepton or liquid peptonoids and found that they were acceptable to the patient and caused no nausea or discomfort. They have a food value that it is well enough to recognize in acute infectious fever of this kind. If the dietetic management of this disease is neglected, it will certainly make the local manifestation more pronounced and the general systemic symptoms will be greatly aggravated.

Hydrophobia—**DIET IN HYDROPHOBIA.**—Diet in hydrophobia is of very little importance. A good nourishing diet, one that will not tax the digestion, is appropriate. In the event of convulsions, or where the patient gives a history of frequent convulsive attacks, for instance, every three or four hours, the diet should be quite light. A large solid diet is very objectionable. A stomach filled with undigested material has a tendency to induce convulsions and certainly adds to their severity and duration, increases the danger of the patient, and aggravates his symptoms, possibly rendering the prognosis more unfavorable.

Influenza.—Influenza is an acute infectious epidemic disease, marked by depression, distressing fever, acute catarrhal inflammation of the nose, larynx, and bronchi, accompanied by neuralgic and muscular pains. According to the organs chiefly affected the disease may properly be classified as respiratory, nervous or gastro-intestinal.

DIET IN INFLUENZA.—The manifestations of influenza are so variable that it is difficult to outline any definite dietary for the disease.

Altogether, the disease is so remarkably depressing in its effects, that a rather generous alimentation with a restricted allowance of stimulants, in the form of eggnog, seems to be indicated. This may be started early in the dietetic management of the case, especially if there is little or no pyrexia. On the other hand, if the fever is considerable, the usual rules for feeding in the acute stage of fevers must be observed, the milk diet being freely supplemented by meat extracts, beef tea and suitable protein preparations. The diet in this disease is practically the same as that usually recommended in all acute febrile conditions. There is no pathological condition in this disease calling for a specially restricted diet. On general principles, however, the diet during the height of the disease, or febrile stage, should be liquid and given in small quantities, frequently repeated. As the symptoms improve, a return to the semi-solid and then to the solid food diet may be made. In the event that convalescence is slow and tedious, the diet should consist of easily digested and nutritious food. It should be given in as large quantities as is agreeable to the patient without taxing his digestion. Milk or eggs, either alone or combined in the form of eggnog may be given between meals.

DIET IN CONVALESCENCE.—Diet in convalescence from influenza is not different from that following any acute febrile condition. Few patients recovering from influenza require much tempting of the appetite. Many, indeed, have an appetite which is quite inordinate and are ready to eat much more than they would in health. A liberal allowance of the ternary food elements, with a glass of milk between meals, may be safely allowed. Oysters, sweetbreads, and white fish are all suitable in the early days of convalescence. Later on, chicken, game, or a well cooked cutlet may be permitted. Strong rich soups, plenty of fresh milk, eggs lightly boiled or poached should be given between meals.

ALCOHOL IN INFLUENZA.—It is doubtful whether it is wise to give alcohol except in the form of milk punch or eggnog. Care must be exercised in prescribing alcohol in any form in this disease. It is usually uncalled for, but in certain cases recovery is accelerated by the judicious use of small quantities of whiskey, champagne, or Burgundy, which should be given only with the meals. Nevertheless, while admitting the possibility of a patient acquiring an alcoholic habit in the period of prolonged depression which so often follows this disease, experience shows that this depression may often be warded off by the judicious administration of alcohol in the acute stage, and in the early days of convalescence. A little brandy, champagne or Burgundy, moreover, given just before meal time, stimulates the desire for food, and if its use is carefully regulated and

strictly limited to meal time—we can see no real harm from its employment. In the febrile stage, good whiskey or brandy in eggnog is preferable, later, it may be found desirable to prescribe wine with lunch and dinner. Port or Burgundy will probably be most suitable if they are well taken. In cases where there is much depression, champagne in small quantities frequently administered sometimes works wonders.

Parotitis—Mumps—**DIET IN PAROTITIS**.—In this disease it is seldom that any special form of diet can be given or recommended. As in other febrile diseases, it is never wise to allow a large amount of solid foods. I think the diet should usually be limited to milk and the cereals; tea and coffee are admissible. When the temperature begins to subside, milk toast, buttered toast, eggs on toast, and soft boiled eggs should be given. If recovery seems to be slow, and in the event that tonics have been recommended to create an appetite, a liberal general diet is recommended.

Pyemia.—Pyemia is a general septic condition characterized by the presence of multiple abscesses. The condition is marked by fever, chills and sweating, jaundice, and abscesses in various parts of the body.

DIET IN PYEMIA.—The appetite is diminished, digestion impaired and the general strength much lessened. The diet must, therefore, be sustaining and as much food be given as possible, in order to overcome the loss of strength and restore vigor. The alimentation should be highly nutritious, easily digested, and sufficiently varied and dainty to tempt the appetite. These general dietetic principles are particularly applicable in the chronic and prolonged cases. The diet in pyemia is practically the same as in other septic conditions where pus has accumulated in any part of the body. In cases with a marked fluctuation of temperature, chills, sweats, etc., solid food should be almost entirely withheld during the active period of pyrexia. During this stage, which may continue for many days or weeks, the nourishment should consist in half a glass of milk every hour and a half or two hours, or half a glass of beef broth, mutton broth, or chicken broth every two hours. If the stomach is very sensitive and has a tendency to eject these aliments, a tablespoonful of panopepton or peptonoids in a little crushed ice may prove of value.

During the inactive febrile stage there is no more important adjuvant in the treatment of this disease than that of a properly selected diet. Anorexia, as well as great feebleness, makes feeding a difficult problem in the severe cases. Easily digested and assimilated foods, such as eggnog, milk, broths and gruels are indicated. Eggs in any form that the patient may fancy are recommended. Our experience has been that two, three or four eggs beaten up in the same way that an eggnog is prepared, and

cooked to a very thin semi-solid consistence, with a little pepper and salt added, are very palatable; a patient sometimes can take four eggs prepared in this way every four hours without any evidence of taxing his digestion. The eggs should be taken in two or three swallows just like a beverage. A glass of milk with two teaspoonfuls of cream thoroughly shaken up or beaten up, so that all the fat globules are thoroughly mixed with the milk, may be taken slowly with a teaspoon every four hours during the twenty-four, or while the patient is awake, and will be very acceptable and beneficial.

During convalescence, the patient should have any kind of meat that his appetite calls for, beefsteak, squab or game. Meats of this kind are very useful in cases of pyemia without fever or between the febrile attacks. Patients can take a great deal more solid food in a disease of this kind if their bowels are kept regular—one movement a day. A question of diet in the treatment of pyemia is the most important consideration in this disease, aside from surgical procedures. The usual practice is to outline an alimentation suitable for patients recovering from any of the infections. W. Gilman Thompson(2) advocates the following sustaining dietary:

DIETARY FOR PYEMIA

The patient is to take a pint of hot water in the early morning to stimulate the stomach and cleanse it of mucus accumulated over-night.

A half hour after the morning bath, milk punch and beef meal or peptonoids.

Breakfast:

A half hour later, consisting of rare steak or chop, eggs, sliced tomatoes, bread with plenty of butter, or cracked wheat and cream. In two hours, kumiss or soup, milk, bread and butter, celery salad, broth, and peptonoids.

Dinner—1 P. M.

Bouillon, rare beef, greens, Burgundy, beer, fruits.

Tea—3 or 4 P.M.

Kumiss, cream, or milk punch, peptonoids, malt extract.

Supper—7 P.M.

Like breakfast.

Bedtime—9 or 10 P.M.

Cream and cocoa or cocoa wine, milk, and peptonoids.

The patient should keep milk, or peptonoids, or some nutritious beverage by the bedside to be drunk if he awakens in the middle of the night.

Rheumatic Fever.—There is an old but true saying that “digestion is the hand-maiden of nutrition” and while the applicability of this dictum is obvious in the fight against all diseases, it is peculiarly so with

regard to the acute fevers. In these maladies the metabolic equilibrium of the human economy is most severely strained, and the resisting forces inherent in the system are taxed to their utmost limit to maintain the right balance 'twixt intake and output. The bodily tissues at such periods of stress and strain are so denuded of their substance, that the nutritional stability of the organism is frequently endangered. In acute rheumatism, therefore, as in other infectious diseases, appropriate diet counts for much if a successful outcome is expected. The art of the physician consists quite as much in recommending a suitable diet in the various diseases, as in prescribing drugs or in recommending other forms of treatment. This is especially true in the fevers, for the wasting brought about by fever must be offset as far as possible by food, and the bodily strength maintained at such a standard that the crisis will be overcome, and the defensive forces of the devitalized and toxin laden organism be enabled to wage a successful fight against the disease producing germs.

DIET IN RHEUMATISM.—The relationship between diet and the cause of rheumatism is still very debatable, although the subject has received a great deal of attention. During the acute attack, the management of the diet is similar to that in other acute fevers. Some differences of opinion exist as to the best diet in cases of acute rheumatism. If the fever is very high, solid foods should be eliminated. Of the milks, sweet milk is preferable. Six or eight glasses of sweet milk in the twenty-four hours are admissible and recommended. Ewart advocates the addition of 10 or 15 grains of salt to each half pint of milk, and Burney Yeo, who favored the alkaline treatment, contrived that during the twenty-four hours his patients should consume at least 90 grains of bicarbonate of sodium in a mixture of milk and water as well as 60 grains of bicarbonate of potash dissolved in a decoction of lemons. Twelve or fifteen glasses of Lithia water, either carbonated or plain, should be taken by an adult every twenty-four hours. Soups and broths are recommended if acceptable to the patient. Grape fruit, lemons, tomatoes, cherries and strawberries are prohibited. In mild cases, dark meats are not recommended but are admissible if the patient calls for them. In acute cases the morning cereals are recommended, rice with gravy, baked Irish potatoes with butter. Beans and peas are frequently called for by the patient and are not objectionable. Oyster or clam broth, in season, is admissible. In the inactive fever stage of rheumatism, oysters and clams raw or cooked can be given. In any stage of rheumatism barley or arrowroot, gruel, buttermilk and kumiss, or broths of all kinds are admissible.

Opinions vary as to the advisability of giving or refusing animal

broths. The English physician, Cheadle, claims that no ill effects attend their use, even in the acute stages of the malady; Senator is of somewhat the same opinion, but Friedenwald and Ruhräh are not so certain as to the value of animal broths and think that they should be used only when there is an unconquerable aversion to milk. Llewellyn(3) holds that the balance of opinion discountenances their employment at this stage of the fever, and this embargo especially obtains in regard to strong soups and the various meat essences. Although animal broths are as a rule contraindicated, chicken broth prepared in the following way is generally acceptable to the patient, seldom if ever does any harm, and is certainly very nutritious. Beat up thoroughly one pound of raw chicken and put it in twelve ounces of water, heat it to a simmering point—without boiling—and keep it at this point for one hour. Then boil it actively five minutes, cool it, squeeze out the meat pulp, add the proper amount of salt and pepper and place it on ice to be used, four ounces at a time, at the temperature preferred by the patient or ordered by the physician or nurse. This is a very good broth, free from danger, and always acceptable and beneficial.

A discussion of the diet most appropriate for acute rheumatism would hardly be complete without giving the views of Sir James Barr, a well known Liverpool physician. These views are decidedly iconoclastic. His theory is that the acidity of the excretions and the excessive formation of sarcolactic acid which obtain in rheumatic fever, forbid the administration of all foods promoting the formation of lactic acid in the gastrointestinal canal, and in consequence he withholds milk and all starchy foods. Furthermore, with the object of minimizing the tendency to excessive fibrin formation, and at the same time obviating the production of adhesions, he earnestly recommends a decalcified diet, pointing out that following this mode of feeding the blood pressure tends to fall, and accordingly the strain on the cardiac valves is correspondingly decreased. In consequence, in order to reach this end, he withdraws milk and all its preparations including cheese, as well as gelatin and animal jellies.

He adopts the following fare—pounded chicken, steamed sole, minced meat, poached eggs and other nitrogenous foods, in conjunction with copious amounts of hot water. On account of its containing silicates and its consequent decalcifying effects, he favors the taking of oatmeal porridge. He prefers syrup of glucose to both cane and milk sugar. Syrup of glucose mixed with infusion of orange forms a palatable drink, and unlike cane and milk sugar does not undergo lactic acid fermentation. He also believes that lemon juice and lemon squash have a distinct value

in this condition. Even during convalescence he forbids milk, but allows a moderate amount of farinaceous food with plenty of fruit and moderate quantities of vegetables. He considers that in order properly to pursue his theory of decalcification, such patients should refrain from taking large quantities of milk, eggs, beef tea, and green vegetables. Sir James Barr undoubtedly recommends a diet of this nature from the point of view of relieving the heart of undue strain, an event apt to occur in acute rheumatism. With regard to cardiac complications in acute rheumatism, these call for modifications in diet. The food in such cases should be in small compass, more solid in character, and more stimulating in nature. Eggs beaten up in milk, meat jellies, pounded chicken, and the more digestible kinds of fish will form a suitable bill of fare.

Acids should usually be avoided by rheumatic patients, although a weak lemonade is allowed in the event of great thirst and a dry sticky tongue. It should be sour, very little sugar if any. For the thirst nothing is better or more beneficial for a patient than large amounts of carbonated water or Vichy.

It is well enough to consider that a patient is convalescent when his temperature has remained normal for twenty-four or forty-eight hours. Fish, oysters and eggs should then be given freely. Possibly all the meats with the exception of ham can be given in moderate amounts when convalescence has been fully established. All vegetables can be given with the exception of acid fruits such as strawberries, tomatoes, oranges, lemons, etc. A large amount of sweets should never be given to rheumatic patients. Any article of diet taking longer than four hours to digest should be avoided. The meals should not be of sufficient size or character to tax the patient's digestion for a longer time. In the event of their doing so, the heavier articles of food should be supplemented by two or three glasses of milk a day served with a piece of toast or biscuit, egg-nogs, or a vegetable diet.

There is no place for alcohol in the treatment of this disease unless possibly in the form of egg-nogs. Watermelons, cantaloupes, bananas, baked Irish potatoes, baked sweet potatoes with butter make a very appropriate diet in all non-febrile attacks of rheumatic fever. Watermelons, cantaloupes, and bananas are allowed even in acute febrile attacks and usually very much appreciated by the patient. Watermelons in season are especially recommended.

It is obvious that the loss of fluid through profuse sweating calls for the ingestion of large amounts of bland unirritating beverages as for example, water, barley water or home-made lemonade. In severe and pro-

longed cases, pyrexia is liable seriously to impair the general nutrition, and this is to be feared especially when milk disagrees or there is a dislike for it. In such circumstances the milk may be reinforced by thickening it with corn-flour, arrowroot or malt. In addition, Fick suggests that the carbohydrate content of the milk may be enhanced by adding milk sugar in the proportion of two teaspoonfuls dissolved in hot water to each glass of milk. Llewellyn sums up that the safest course to pursue, in the acute stages, at any rate, is to adhere to a strict lacto-farinaceous regimen, not forsaking it lightly in compliance with a capricious patient's whims, but only when objective signs appear pointing to failure of nutrition. However, although in a general way it is probably the wisest procedure to prescribe a lacto-farinaceous diet, the individual must be studied and the personal element not overlooked in our anxiety to abort the disease. Recent findings have shown the errors of the old view that generous feeding of fever patients tended to raise the temperature. The clinical observations of F. J. Smith and others on the effects of diet in typhoid fever points to the conclusion that the digestive powers of febrile patients have been considerably underestimated. The more generous dieting of those suffering from acute rheumatism would, therefore, seem to be based on rational rather than empirical grounds.

Septicemia.—Septicemia is a morbid condition due to the presence of pathogenic bacteria and their associated poisons (toxins and toxalbumins) in the blood. The condition is marked by chills, profuse sweat, irregularly remittent fever and great prostration.

DIET IN SEPTICEMIA.—Every case of septicemia should receive a diet especially recommended by the physician. If the condition is active with high fever and severe septic intoxication, a liberal allowance of water and a nutritious sustaining liquid diet should be insisted upon. If the case is of a mild character, possibly without fever the most of the time, the diet should be semi-solid. Egg-nogs, possibly twice a day, soft boiled eggs or eggs on toast, cereals, soups and broths of various kinds are admissible. The diet in all these septic conditions is dependent upon the symptoms that are being exhibited and the general state of the patient, etc. The diet in this condition should be the same as in pernicious intermittent fever. The nourishment should be pushed when the patient is without fever, but should be liquid during the febrile stage. There is no disease which requires a more judicious selection of diet than septicemia.

If nephritis complicates a septic or pyemic malady, the dietary must be modified accordingly and suitably arranged. If an examination of the urine reveals a trace of albumin, or a few granular casts with or without

albumin, this points to a pathologic condition of the kidneys. Then the diet should be restricted to milk and gruels with an abundance of water and a little fruit or fruit juice. The diet should be the same as outlined for nephritis in Volume III, Chapter IX. The bowels should be emptied regularly. Only such foods should be ingested as will not tax the organs of excretion, the liver or kidneys. Patients must be placed in a comfortable bed in a warm room well protected from the ill effects of cold and dampness.

In pyemia and septicemia patients enfeebled from great prostration, anorexia may be so marked as to make feeding quite difficult or even impossible, and food must here be given by the rectum. As in similar maladies in which mental hebetude exists at times, water should be given at regular intervals and in sufficiently large quantities to keep the kidneys acting freely. If sufficient water cannot be given by the mouth, it should be given by rectum—proctoclysis, or beneath the skin, hypodermoclysis—in the flank. It is in these cases especially that hypodermoclysis has proved most useful. Physiologic salt solution administered subcutaneously in considerable quantities, two to three pints, will provoke a copious excretion of urine, which quite often is followed by the mitigation of all symptoms. In cases of extreme danger, it is advisable to open a vein and administer the physiologic salt solution intravenously. In a large majority of cases a pronounced fall of temperature promptly follows the copious diuresis that is thus produced.

The condition of the patient and the stage of the disease are the indications for increasing the alimentation. When, as happens in many cases, marked remissions of temperature occur, sustaining nutritious food should be crowded upon the patient (see dietary below), but during the hours of pyrexia, food should be given in small amounts and in such forms as can be easily digested and readily absorbed. Such a dietary was outlined by Weber in his Croonian Lectures in 1885, which we incorporate herewith:

DIETARY IN SEPTICEMIA

7 A.M.

While still in bed, a cup of milk with a dessertspoonful of Cognac or lime water or a cup of tea or cocoa, with bread and butter.

Breakfast—8.30 to 9 A.M.

After dressing, milk and tea or coffee, bread and butter, fish, ham or bacon.

Lunch—11 A.M.

Milk, kumiss, or broth, or a sandwich and glass of wine.

Dinner—1 to 1.30 P.M.

A substantial meal of meat, poultry, fish or game, fresh vegetables, a light pudding, fruit, and a glass of wine.

Tea—4 P.M.

Milk or kumiss, tea or coffee, with bread and butter or biscuit.

Supper—7 P.M.

Another meal like that at 1 P.M.

Bedtime—9.30 to 10 P.M.

A cup of milk, bread and milk, or milk, or cream and farinaceous food, such as Hart's, Liebig's, Nestle's, or Mellin's. A glass of brandy if there are night sweats.

Tetanus—Lock Jaw—DIET IN TETANUS.—The food in tetanus should be given every one or two hours and from one to seven ounces should be taken at a time. Peptonized milk, milk punch, eggnog, albumin water, panopepton or any reliable predigested beef or meat broths and stimulants are admissible. Milk is in all probability one of the most reliable diets that can be given in cases of tetanus. It is always accessible, and nine times out of ten is acceptable to the patient. When given in the proper quantities it contains a sufficient amount of nourishment. It disagrees with the digestive tract less often than any other food that can be given. A physician always knows the amount of nourishment that his patient has received when the nurse tells him that the patient has taken two ounces of normal sweet milk every two hours during the last twenty-four. It is not so if any other form of diet is recommended. If a small steak is ordered, if butter and potatoes are ordered, or if milk toast is ordered, the physician never knows exactly how much nourishment the patient has received. Consequently in tetanus, for an adult, if the patient receives seven glasses of sweet milk and six soft boiled eggs in the twenty-four hours with three or four or five beaten biscuits during that time, the medical attendant knows what the patient has received. The writer recommends that diet in tetanus.

REFERENCES

1. FRIEDENWALD and RUHRÄH. Diet in Health and Disease.
2. THOMPSON, W. GILMAN. Practical Dietetics, pub. by D. Appleton & Co.
3. LLEWELLYN. Practitioner, London, Jan., 1916.

CHAPTER XII

DIET IN DISEASES OF METABOLISM

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General Considerations.

Diseases of Metabolism: Diabetes; Obesity; Gout and Uric Acid Diathesis.

GENERAL CONSIDERATIONS

The diseases of metabolism include diabetes, obesity, gout and the uric acid diathesis, osteomalacia, rachitis and, in a special sense, chronic rheumatism. The perversions of metabolism that occur in many other diseases are a secondary symptom of definite underlying causes; whereas in the diseases of metabolism proper, metabolic derangement, as far as we know today, is the primary event and the determining factor in the production of the disease.

All the diseases of this group, in particular diabetes, obesity and the uric acid diathesis, are intimately related to one another, pathogenetically, chemically and clinically. In the one perversion of the carbohydrate metabolism, in the other of the fat metabolism, in the third of the protein (nuclein) metabolism predominates. Each is characterized by an inability on the part of the organism to destroy sugar or fat or albumin (nuclein) in a normal manner. In this way sugar, fat and nucleins and their congeners accumulate and the pictures of diabetes, obesity and gout are created. The metabolism of the three groups of foodstuffs is, however, so intimately concatenated that, as a rule, we witness combinations of diabetes and obesity; of diabetes and gout; of gout and obesity; or of all three together.

The main therapeutic indication in all the diseases of this group is by dietetic means to compensate the defective intracellular nutrition and at the same time to maintain adequate general nutrition.

As the dietetics of rachitis, osteomalacia and chronic rheumatism are discussed in other portions of this book, this chapter will deal exclusively with the dietetics of diabetes, obesity, gout, chronic rheumatism and the uric acid diathesis.

DISEASES OF METABOLISM

Diabetes Mellitus—DIET IN DIABETES MELLITUS.—Three objects are to be accomplished by dietetic methods in diabetes, namely first, to maintain the general nutrition of the patient; second, to increase the tolerance for carbohydrates; third, to reduce or prevent the loss of sugar in the urine. In diabetes, with the loss of valuable unconsumed sugar in the urine, a diet that would adequately feed the normal individual does not furnish the body with a sufficient caloric intake. As a result the patient, once the deficit is not supplied, consumes his own tissues and loses flesh. A careful metabolic study of each individual case will determine this deficit, so that calorimetric feeding can be instituted.

Individual peculiarities and various conflicting factors, however, may determine deviations from the schedule that has been mathematically calculated from the metabolic study, so that the routine adoption of calorimetric methods is apt to be fraught with the same dangers as slipshod routine methods without any underlying calorimetric studies.

The following case report cited from the author's "Clinical Urinology" (p. 73), may serve as an illustration of a metabolic study in a case of diabetes:

Mrs. W. P.—Weight, 60 kilos.

Calories required for adequate nutrition, $60 \times 35 = 2,100$.

Average diet on six successive days:

Proteins.	150 gm. x 4.1 =	615.0 cal.
Carbohydrates.	190 " x 4.1 =	779.0 "
Fats.	110 " x 9.3 =	1023.0 "
		<hr/> 2417.0 cal.

The patient's daily average sugar excretion on four successive days on this diet was 160 gm. This amount calculated in calories must, therefore, be deducted, as follows:

Average daily sugar excretion.	160 gm. x 4.1 =	656.0 cal.
		<hr/> 1761.0 cal.

Instead of receiving, therefore, the full caloric value required, *i.e.*, 2,100 cal., the patient, owing to the loss of sugar, only utilized 1,761.0

cal., although the diet represented 2,417.0 cal. This means a deficit of $2,100 - 1,761 = 339$ cal. And these deficient calories unless supplied in additional food must be supplied from the destruction of the patient's proper tissues.

One can further readily calculate what proportion of this deficit was made good from the albumin of the patient's tissues, what from the fat (for the patient lost weight on this diet); and the diet can be regulated accordingly. All one has to do is to determine the output of nitrogen in the urine and feces, and compare it with the nitrogen intake (food nitrogen).

This patient, for instance, received in the daily diet 150 gm. of albumin, and as albumin contains 16 per cent of nitrogen, this amount contained 24.0 gm. of nitrogen. On this diet the patient excreted a daily average of 23.7 gm. of N. in the urine, and 3.01 gm. of N. in the feces, making the total N. output $23.7 + 3.1 = 26.8$ gm. of N. The nitrogen output, therefore, was greater by 2.8 gm. ($26.8 - 24$) than the N. intake, and this excess must have been derived from the patient's own albumin. These 2.8 gm. of N. are contained in 17.5 gm. of albumin ($2.8 \times 100 \div 16 = 17.5$).

As 17.5 gm. of albumin can produce only 71.75 calories ($17.5 \times 4.1 = 71.75$), there still remain 268.25 ($339 - 71.75 = 268.25$) of the 339 deficient calories to be accounted for. As these must have been derived from the patient's fat, one can readily determine by dividing 268.25 by 9.3 (the caloric value of one gram of fat), that $268.25 \div 9.3 = 28.8$ gm. of the patient's fat were consumed.

The patient, therefore, on a diet valued at 2,417 calories, *i.e.*, considerably more than the calculated value necessary to nourish a normal subject of 60 kilo (2,100 calories), lost 17.5 grams of her own albumin and 28.8 grams of her own fat.

If the diabetic could use none of the sugar that enters the blood stream, the question of feeding such a case would be theoretically very simple. Carbohydrates would have to be excluded from the diet and replaced by sufficient protein and fat, vicariously to make up the caloric deficit. In the above case, *e.g.*, the patient would have to receive 17.5 grams of albumin and 28.8 grams of fat, in addition to the foodstuffs enumerated in the above diet. The great majority of diabetics, however, can utilize some of the sugar. And it is bad practice to withhold carbohydrates permanently on account of the deleterious effect upon the appetite and the digestive function, as well as because of the danger of acetoneuria.

It is, therefore, important in every case to undertake tolerance determinations for carbohydrates, in order that the so-called boundary of assimilation for different carbohydrates may be established and the patient fed accordingly. For this purpose, the patient is given a diabetic test meal consisting of carbohydrate-free articles plus a weighed portion of some carbohydrate food. The following table quoted from von Noorden incorporates the most important carbohydrate-free articles that can be used to arrange such a test meal. This table can, of course, also be utilized in arranging dietaries for diabetic patients.

The following diabetic test meal may be used almost as a routine:

DIABETIC TEST MEAL

Breakfast:

Two soft-boiled eggs; 150 c.c. of weak tea with a tablespoonful of cream; a beefsteak, weighing (cooked), 100 grams.

Dinner:

Bouillon with one egg; boiled or fried fish and broiled chicken, the two together weighing (cooked) not more than 250 grams; a little celery; boiled onions; cauliflower; lettuce salad with plenty of oil dressing; a cup of weak tea or coffee with a tablespoonful of cream; about 30 grams of Neufchatel or Camembert cheese.

Supper:

Two boiled eggs; cold asparagus, or tomatoes, or lettuce salad with plenty of oil dressing; a little bacon; a cup of weak tea with two tablespoonfuls of cream.

The patient is placed upon this diet for forty-eight hours. If at the end of that time the urine is sugar-free, one is dealing with a mild form of diabetes. And it now becomes necessary to determine how much carbohydrate food the patient can tolerate without excreting sugar. This is done by adding white bread to the above test meal, beginning with 100 grams during the first day distributed over two meals in 50 gram quantities and increasing this bread ration each day by 50 grams until sugar appears in the urine. If the patient on one day, for instance, excretes no sugar after taking $3 \times 50 = 150$ grams of bread and on the next day, while eating $4 \times 50 = 200$ grams of bread passes some sugar, then we say that the boundary of assimilation lies between 150 and 200 grams of white bread. By consulting a table giving the equivalents of white bread, the tolerance of the patient for other forms of carbohydrate can readily be calculated. Such a table is appended below.

The carbohydrate contained in 100 grams of white bread is equivalent to the carbohydrate in:

STARCH CONTENT OF VARIOUS FOODS EQUIVALENT TO 100 GRAMS OF WHITE BREAD

	2 liters of milk or buttermilk.
120	grams of rye or graham bread.
200	" " aleuronat or gluten bread.
70	" " Zwieback.
100	" " Chocolate.
80	" " chestnuts (peeled).
80	" " flour (wheat, rye, barley, buckwheat).
70	" " noodles or macaroni.
70	" " rice.
70	" " oatmeal.
120	" " dried peas, beans, lentils.
200	" " green peas.
360	" " new potatoes.
280	" " old potatoes.
240	" " fresh apples, pears, plums, apricots, cherries, grapes.
400	" " strawberries, raspberries, gooseberries, blackberries, cranberries, huckleberries.
100	" " figs.
	6 bananas.
	6 peaches.
	Two handfuls of walnuts, hazelnuts, almonds.
	1 to 3 liters of Port, Sherry or Madeira.
	1½ liters of beer.

USE OF BREADS.—Most so-called diabetic breads contain approximately 50 per cent of carbohydrate. The vegetable albumins (aleuronat, roborat, plasmon, gluten) all contain about 5 per cent of carbohydrates. These breads are made from such flours plus a certain amount (one to four parts) of ordinary flour. They should only be used as equivalents for white bread in the proportion of about two to one. Their indiscriminate use, which is so popular with the laity, who imagine that these breads can be safely taken *ad libitum*, is therefore to be condemned as dangerous. They fulfill a useful purpose, however, owing to the fact that twice as much of the various diabetic breads can be eaten as of ordinary white or rye bread and still no greater amount of carbohydrate be administered. This is an advantage, inasmuch as the bulk of the bread satisfies the craving of the patient for bread, and, at the same time, enables him to ingest a larger amount of butter than if half the quantity of white bread were permitted.

According to the same principle it is often of advantage to give diabetics very porous fluffy breads on account of their bulk; for they satisfy the appetite if they are cut in thin slices and buttered freely. Above all,

they satisfy the eye and the mind without injuring the stomach or the carbohydrate metabolism. Still another bread for diabetics, that contains very much less carbohydrate than either ordinary white bread or bread made from gluten flour and wheat or rye flour, is almond meal bread made from ground almonds, containing about seven per cent of carbohydrate, with the addition of butter, eggs, salt and spices. Unfortunately this bread is not very palatable, tasting more like cake than bread, and hence is not well tolerated for an indefinite time by most diabetics.

Three Degrees of Diabetes Distinguished.—For the successful feeding of diabetics, three degrees can be determined for practical purposes:

First, *the mildest form of diabetes*, in which the sugar disappears within two days after complete withdrawal of carbohydrate food; and also those cases in which the patient fails to excrete sugar upon the addition of from 100 to 150 grams of white bread to the strict diet.

In the first category, two special types can be distinguished, namely, forms occurring in usually obese, middle-aged or old individuals, and forms occurring in young people the prognosis in the former class always being better than in the latter. The younger group are usually of a neurotic type and should be handled with the greatest care lest they develop into cases of medium or severe diabetes.

A second category may be called *diabetes of medium severity*. Complete withdrawal of carbohydrates is here required for a period extending over two or three weeks before the urine becomes sugar-free. Again, several groups must be distinguished, viz., one group in which prolonged feeding with a carbohydrate-free diet not only causes the disappearance of sugar, but also a general improvement in the condition of the patient, an increase in weight and a disappearance of acetone bodies from the urine; a second group in which the withdrawal of carbohydrates causes the sugar to disappear, but in the beginning produces considerable loss of weight, general malaise and an increasing acetonuria. In a few days a general change for the better occurs; the patients regain weight and the acetonuria stops.

In the third group the patients' condition becomes immediately aggravated, even after the sugar disappears. The loss of weight, the general weakness and the acetonuria do not disappear, even after many days; various digestive disorders, notably diarrhea, moreover supervene. These patients form the transition to the third category, *the severe type of diabetes*.

In this type it is impossible to render the patient sugar-free, even after weeks of carbohydrate-free diet, showing that these individuals are

unable to consume even the sugar which is generated within their own tissues from the disintegration of their own albumins. In these cases, protein starvation or complete starvation, to be discussed below, must often be instituted before the urinary sugar and the acetonuria are brought under control.

Inasmuch as the prognosis and the treatment of these three categories vary radically, each type will be separately discussed.

DIET IN THE LIGHT FORM OF DIABETES.—The patient should be placed upon a diet containing no carbohydrate food, care being taken that enough calories are supplied adequately to nourish the patient. By supplying abundant fat and some alcohol to replace the carbohydrate that is omitted from the diet, this can easily be accomplished. After four or six weeks of this restricted diet, and provided the patients maintain their weight and do not develop alarming degrees of acetonuria, a tolerance test should be made and an amount of carbohydrate food administered just below boundary of tolerance established, using white bread or any of its equivalents vicariously.

Should sugar reappear again, then the carbohydrate food should be reduced, or preferably stopped altogether, until the urine again becomes sugar-free. From time to time, even in the cases that are sugar-free, a period of restricted dieting, if necessary a protein-free diet, should be administered as a "rest" to the carbohydrate metabolism.

There should be no difficulty in this way in keeping these patients permanently sugar-free, and in favorable cases in gradually bringing them to such a point that they can live upon a fairly liberal diet, from which only actual sugars are excluded, without glycosuria and with maintenance of their normal weight and strength.

DIET IN DIABETES OF MEDIUM SEVERITY.—The patients should be placed for a prolonged period upon a carbohydrate-free diet, provided they can tolerate this restriction (*see above*). Small amounts of carbohydrate food are then gradually added, after the boundary of tolerance for different carbohydrates has been established. Under careful supervision of the weight, the glycosuria and the acetonuria, broader feeding is in this way slowly instituted. In these cases protein starvation is particularly useful. The average meat ration should never exceed an amount corresponding to about 150 grams of albumin, with a fat ration of about 200 grams. The addition of 70 to 80 grams of alcohol per diem generally gives the patient a total of 3,000 calories, sufficient to compensate for any slight loss of sugar that may occur. If no alcohol is given, the fat ration may be increased by 40 to 50 grams.

In those cases of this type, in which it becomes impossible to render the urine sugar-free, even after a prolonged carbohydrate-free diet and a certain degree of protein starvation, complete exclusion of proteins as well as carbohydrates from the diet must be practiced. This constitutes undernutrition and, especially in the lean type of diabetes, can only be carried out intermittently and for short periods of time. The feeding with vegetables exclusively for a day or two at a time is a very useful method of handling these cases. It will often be found that after protein fasting more tolerance for proteins has been acquired. In these cases too the starvation plan may be employed. It will be discussed in full below.

Sooner or later in this type it becomes necessary, as a rule, to administer some carbohydrate food, even at the risk of promoting glycosuria for the time being. But the transition from the carbohydrate-free diet low in protein to a more liberal diet should be very gradual and the ration of carbohydrate food should be only slowly increased. If the glycosuria rapidly increases, the carbohydrates must be again reduced and finally stopped. Here the plan of feeding with a single carbohydrate often gives better results than administering several starchy foods together. So that on certain days only bread; on others only potatoes or rice or oatmeal, etc., are given. Individual factors are important, as different individuals vary in their reaction to the different carbohydrates. And it may be necessary to make tolerance determinations in each case with the different carbohydrates.

THE OATMEAL CURE.—In these cases, too, the oatmeal cure, which is a prototype of other so-called “cures” with simple carbohydrates, may be described.

The method of administering the oatmeal cure (as recommended by von Noorden) is the following: 250 grams of oatmeal are cooked for several hours in water, to which a little salt is added; while the porridge is boiling, about 100 grams of butter are added and later, after the boiling is completed and the mess is cooled, about 100 grams of egg albumin, or a like amount of some vegetable albumin, may be added to the porridge while it is still on the fire. This soup is administered about every two hours during the day in such quantities that the whole amount is eaten in the course of twenty-four hours; in addition, the patient is permitted to take some brandy or claret and water or a little strong black coffee.

It will readily be seen that it is impossible to continue this mode of dieting for a long time; the patients naturally soon acquire a distaste for the oatmeal soup and when this period comes the treatment will have to be stopped, and it is worse than useless to force it.

The results from this treatment are either brilliant within the first few days after it is begun, as manifested by a great reduction or the complete disappearance of the sugar and the acetone bodies from the urine, or they are altogether negative from the start. Therefore, if good results—striking results—are not seen within three days, it is probably better to discontinue the oatmeal cure and to resort to other measures. One or two bad consequences can perhaps be attributed to the prolonged use of the oatmeal cure after an appreciable effect failed to appear within two or three days. This group of patients suffered a reduction of their tolerance for other carbohydrates, and above all, developed alarming degrees of acetonuria.

Probably if the rule is observed to stop the oatmeal cure if no good effects are seen within three days, the number of bad results will be reduced to insignificant figures. In about 35 per cent of all cases good results are had, varying from a slight reduction of the acetonuria and a considerable reduction of the urinary sugar during the time the oatmeal treatment was administered, to remarkable improvement in very serious cases in which the sugar practically disappeared, the gain in weight was rapid and the reduction of the acidosis almost instantaneous, and in which, moreover, the after-effects of the “cure were demonstrable for months after the patient had left the hospital.”

It is interesting and important to note, as well, that the best results are obtained in juvenile diabetes, a form that is particularly intractable by ordinary methods of treatment, and that is particularly damaged by the old-fashioned routine treatment of feeding on a starch- and sugar-free diet. No case of juvenile or adolescent diabetes should be deprived of the benefits of an oatmeal cure. At the least the trial should be made, and if the “cure” fails, no harm will have been done, provided it is properly carried out and not forced after the third day when no results appear within that time.

DIET IN THE SEVERE TYPE OF DIABETES.—Feeding in the severest types of diabetes is very difficult, as it is impossible to cause the complete disappearance of the sugar from the urine, even upon protein starvation. Here, therefore, less attention must be given to reducing the glycosuria than to maintaining the body weight and combating the tendency to acidosis, which is usually very pronounced in this group. The carbohydrates in this group have practically no food value, because they are not utilized but are promptly excreted. They are merely an addition to the diet that enables the patient to ingest enough of the necessary albumins and fats to maintain a certain degree of nutrition. The complete withdrawal of

carbohydrates for prolonged periods of time not only destroys the appetite, but often produces severe digestive disorders in these patients.

CONSIDERATION OF THE STARVATION PLAN.—Here the starvation plan originally advocated by Guelpa, Naunyn and von Noorden, and recently more emphatically recommended by Allen and his co-workers, occupies a useful place. Provided it is not used indiscriminately in every type of diabetes, this method may be of the greatest value. In milder cases of diabetes, in which the glycosuria and acetonuria can be made to disappear by simple reduction of carbohydrates, the method is not only useless but contra-indicated; for in this group of cases there is danger of starvation, because these people are so nearly normal. Starvation in a normal individual is dangerous and unquestionably favors the development of acetonuria. Moreover, it seems useless to employ so heroic measures when simpler measures can accomplish the same purpose. In the more severe type of cases, starvation should not be abruptly instituted, but a gradual reduction of carbohydrates and proteins with a preliminary vegetable day or two should precede the starvation period. There is great danger in placing even severe cases of diabetes immediately upon starvation unless one is dealing with an acute emergency.

In the very severe types, even in cases with threatening coma, the response to starvation is usually very good. The sugar almost invariably disappears, the acidosis in the beginning is apt to rise, but usually disappears again, if the starvation period is prolonged. Experience does not favor starvation extending over four days. At the end of that time a certain amount of vegetables and alcohol should be administered, and then, if necessary, a second period of starvation added.

Clysmata of oatmeal prepared in such a way that six ounces of oatmeal gruel are mixed with about twenty grams of pancreas powder and five grams of sodium bicarbonate and allowed to stand for about an hour, will be found of use during the starvation period. This clyisma mixed with a little table salt and from ten to fifteen drops of tincture of opium is injected through a high colon tube twice a day. It is possible by this means to prolong the starvation days without such a high degree of acidosis and with less discomfort to the patient. It is well during the starvation days to allow some water and a little black coffee and dilute whiskey or brandy.

The resumption of fat feeding must be particularly well controlled, as after a starvation period, the addition of fats is apt to produce particularly alarming degrees of acidosis.

The ultimate results from this method of treatment in the severe type

of cases cannot yet be definitely stated. Keeping the patients at a lower level of nutrition than was previously customary seems to be a rational procedure and of benefit to the patients, particularly as far as the acidosis and the danger of coma are concerned. If it can be made clear to the patients that they are to remain thin and that they are not to expect to regain their former weight, little difficulty is usually experienced in feeding these patients with an amount of food corresponding calorimetrically to their reduced weight.

The educational value, moreover, of this method is great. The more intelligent patients readily understand the advantage of an occasional starvation day, preceded and followed by vegetable days. A certain number of patients, moreover, can be readily taught the use of food tables, the methods of calculating equivalents, and the simple routine laboratory methods of urine testing. So that, after a hospital period, they learn how to handle their own case under the occasional supervision of their physician much better than formerly. In cases so treated bicarbonate of soda need not be given as a routine, but a certain amount of alcohol should be administered continuously.

Obesity.—Broadly speaking, any article of food can form fat according to its caloric value. And, if more calories are introduced than are required for nutritive equilibrium, then fat will be deposited in the tissues. If less are introduced, the organism primarily attacks its fat reserves and a deduction in weight is produced. The idea that certain articles of food form fat and others do not is erroneous. Given undernutrition and exhausted fat reservoirs, then albumins, carbohydrates or fats can vicariously lead to the formation of body fat and sparing of the reserves. In a normal subject, carbohydrates and fats on account of their greater assimilability are more apt to contribute to fat deposits than albumins. And by the same token they should primarily be reduced in reduction cures. Moreover, the reduction of albumin below certain normal average requirements is always a precarious procedure, whereas fats and carbohydrates can generally be reduced without particular detriment to the individual.

DIET IN OBESITY.—There is both a *science* and an *art* of conducting reduction cures. The first step should be to determine the normal caloric requirement of the individual if he were of normal weight. For this purpose tables must be available giving the normal average weight for individuals, both men and women, of a certain height.

The table of Quetelet that follows is a standard one:

DIET IN DISEASES OF METABOLISM

NORMAL HEIGHT AND WEIGHT AT ALL AGES

Age, Years	Men, Height (In Meters)	Weight (Kilograms)	Women, Height (In Meters)	Weight (Kilograms)
0.....	0.5	3.2	0.49	2.91
1.....	0.7	9.45	0.69	8.79
2.....	0.77	11.34	0.78	10.67
3.....	0.86	12.47	0.85	11.79
4.....	0.92	14.23	0.92	13.00
5.....	0.99	15.77	0.98	14.36
6.....	1.05	17.24	1.10	16.01
7.....	1.11	19.10	1.15	17.54
8.....	1.16	20.76	1.18	19.08
9.....	1.22	22.65	1.19	21.36
10.....	1.28	24.52	1.25	23.52
11.....	1.33	27.1	1.20	25.7
12.....	1.39	92.8	1.35	29.8
13.....	1.44	34.4	1.40	32.9
14.....	1.49	38.8	1.45	36.7
15.....	1.55	43.6	1.49	40.4
16.....	1.59	49.7	1.54	43.6
17.....	1.63	52.9	1.56	47.3
18.....	1.66	57.9	1.56	51.0
20.....	1.67	60.1	1.57	52.3
25.....	1.68	62.9	1.58	53.3
30.....	1.68	63.7	1.58	54.3
40.....	1.68	63.7	1.58	55.2
50.....	1.67	63.5	1.53	56.2
60.....	1.63	62.9	1.52	54.3
70.....	1.62	59.5	1.52	51.3

By multiplying the weight of the individual by 30 to 35 the approximate daily caloric requirement can be obtained. As an example, assuming that a patient were 1.67 meters tall, then, according to the table, he should weigh about 61 kilos and require 61×35 calories a day. Continued feeding below this level, especially when associated with restriction of the liquid intake, is bound to produce a loss of weight.

In the simplest form of reduction cure, the diet is arranged in such a way that this particular number of calories is approximately furnished. Here the caloric intake is only relatively insufficient as compared to the abnormal bulk and weight of the patient. If under this schedule the patient does not lose weight with sufficient rapidity, then the caloric intake must be still further reduced.

The popular reducing dietaries of Banting, Oertel, Epstein and others possess very low caloric values ranging from 1,100 to 1,600 calories a day. These "systems" are usually far more severe than is either safe or necessary. A much better plan is to determine on one of three degrees

of reduction cures, according to the clinical phenomena presented and the necessity for a rapid or slow reduction cure. In the first degree the caloric requirements are reduced to $\frac{4}{5}$ of normal; in the second to $\frac{3}{5}$ and in the third to $\frac{2}{5}$, so that the individual requiring normally 2,500 calories should be fed on 2,000, 1,500 or 1,000 calories, according to the degree of reduction cure decided upon.

In the first degree the loss of flesh is very slow, not exceeding two or three pounds a month. In order to accomplish this, considerable drink restriction and abundant physical exercise must accompany the treatment. The $\frac{4}{5}$ diet is chiefly useful as a prophylactic in subjects developing merely a tendency to obesity and in whom a further increase of fat is to be prevented. It requires very little sacrifice on the part of the patient and can be kept up almost indefinitely without detriment. By simply advising more moderation in eating, forbidding alcoholic beverages, restricting the liquid intake to about one quart a day, by giving very "filling" food of small caloric value, this degree of underfeeding is readily accomplished.

The second degree, or the $\frac{3}{5}$ diet, is useful chiefly in very strong obese individuals, who want to get rid of surplus fat and in whom there is no counterindication to violent physical exercise; also in a group of individuals who are fat, but in whom complicating disorders of the circulatory apparatus or the bronchi render it impossible to work off the fat by exercise, so that the reduction of the fat must be brought about by dietetic restrictions alone; in the third place, in very fat individuals in whom the attempt is made to institute the third degree of reduction cure, but in whom alarming symptoms promptly develop when severe food restriction is begun. Here the $\frac{3}{5}$ diet is used as a transition diet to the $\frac{2}{5}$ diet. The second degree of diet rarely causes a loss of more than six to ten pounds a month.

The third degree reduction cure, representing $\frac{2}{5}$ of the normal diet, is a rapid reduction cure and should only be carried out in an institution. The fatter the individual the more rapid the loss of fat. If systematic exercise and drink restriction can be practised, as much as thirty pounds a month can be sacrificed with safety. Constant supervision is required and such a course should never be carried out for longer than from four to six weeks. In very young and in very old people rapid reduction cures should be altogether eschewed. In children and in adolescents very serious damage is often done, growth stunted and serious complications engendered. Here as in the very aged, the results are rarely satisfactory, always fraught with danger, and at best transitory.

The *art* of reduction cures occupies itself with the kind of food and its method of preparation. Inasmuch as it is of the greatest importance that the albumin content of the body be not unduly attacked, a certain amount of albuminous food must be given in all cases, in order to spare the body albumins. Properly speaking the known minimum for maintaining adequate nutrition in an individual performing ordinary physical exercise lies between 60 and 80 calories a day. This amount of albumin, corresponding to 40 to 60 grams of lean meat, should be supplied. If the patients have been excessive meat eaters, they may safely continue an abundant meat ration, provided the total caloric value of the food is maintained within the prescribed caloric limit. If, on the other hand, they have never been excessive meat eaters, there is no reason why they should be forced to eat much meat.

As far as the fats and carbohydrates are concerned, it is best, from a practical standpoint, to reduce the fats and to give relatively large quantities of such carbohydrate foods as possess bulk, for the latter incorporate a relatively small caloric value, while at the same time fully satisfying the appetite of the patient and giving a sense of fullness after meals that is associated with adequate nutrition in the minds of the laity.

RESTRICTION OF LIQUIDS.—The restriction of liquids is one of the most important steps in every reduction cure. It is always easy rapidly to reduce the weight of an obese subject by restricting the liquid intake to the minimum, especially in combination with saline purgation; and the loss of weight from this cause becomes particularly apparent during the first few days of the cure, partly on account of the direct loss of water from the tissues, partly on account of the fact that an individual drinking little water is not apt to eat as much as an individual taking a normal amount of liquid. The suggestive effect of the rapid reduction in the first few days is also a factor that is by no means negligible, as it encourages the patient during the most trying period of his treatment to persist in the sacrifice to his palate and appetite. Drink restriction does not produce permanent effects, however; and the weight lost by this method is rapidly regained, as soon as water drinking is resumed.

Alcohol may be administered to obese subjects according to its caloric value, one gram representing about seven calories. It is especially indicated in patients who have been accustomed to a little alcohol all their lives; and in such individuals the withdrawal of alcohol is usually a very irksome and entirely unnecessary hardship.

SPECIAL ARTICLES OF DIET.—There are a number of special articles of diet that are particularly valuable in the dietetic treatment of obesity.

Thus in selecting meats the lean varieties should be given the preference. Lean meat contains about 20 per cent of albumin and from $1\frac{1}{2}$ to 2 per cent of fat; so that 100 grams of lean meat furnish about 100 calories. The meat should be prepared by roasting, broiling or stewing. Foods fried or served as ragout or with bread crumbs, rich sauces and gravies incorporate incalculable amount of fat, so that the caloric value of a meat dish prepared in this way may assume very large proportions. A number of animal foods are a welcome addition in form of delicacies that contain exactly 100 calories, viz.:

45	grams of caviar.
40	" " sardines.
100	" " boiled lobster.
160	" " crab meat.
120	" " oysters (about 14 to 18 oysters of medium size).
25	" " pate de foie gras.

Cheese is very useful, because it is filling even in small quantities. Swiss cheese and American cheese contain about 28 per cent of albumin, 30 per cent of fat and 2 per cent of carbohydrate, so that 25 grams of these cheeses furnish about 100 calories.

100 c.c. of milk furnish about 60 calories. And this amount can be allowed daily as a welcome addition to the bill of fare. 100 c.c. of buttermilk only contain from 40 to 45 calories and a whole quart only about 250 calories.

Especially valuable are thin soups, bouillon, beef juice, as their caloric value is practically nil. They are filling, pleasant to the taste, and a meal begun with a large plate of bouillon gives the patient the agreeable conviction that he is getting plenty to eat.

COMMONER VEGETABLES, FRUITS, ETC.—Of the commoner vegetables, 100 grams of potatoes (boiled, baked or mashed and served with butter) contain about 1.5 per cent of albumin and 18.5 per cent of carbohydrate, possessing a total caloric value of 80. Other vegetables growing underground and those growing in pods should be restricted, because they contain large and varying amounts of carbohydrates. Whenever allowed, the amount should be weighed and the caloric value included in the calculation. All other vegetables are particularly useful, as they possess a very small caloric value in proportion to their bulk and consequently readily produce a sense of satiety, incidentally acting well upon the bowel function. They should, of course, be served without the addition of cream, butter or flour, unless the caloric value of these ingredients is calculated.

With the exception of bananas, grapes, figs, dates, raisins, all fruits are permitted with very little reserve. About 250 grams of ordinary fruits contain only 100 calories; and, as they are very filling and stimulate the bowel action, they are useful.

Some bread is almost indispensable. And there is no objection to its use, if it is carefully weighed and its caloric value calculated. The same rules here apply as in diabetes. The varieties made of vegetable albumin (gluten breads, etc.) are particularly useful; for they are very fluffy and voluminous, occupy a large bulk and possess a relatively small caloric value.

In regard to the value of mineral waters, Kissingen, Vichy, Homburg, Marienbad, etc., only this can be said: that the profuse diarrheas and the copious urination generally produced by these waters aid, of course, in ridding the organism of surplus water. Their suggestive effect, moreover, is great, on account of the reputation of the different watering places. Beyond this, of course, they have no effect whatsoever upon any loss of flesh that it is desired to produce.

Gout and the Uric Acid Diathesis.—Whereas in diabetes and obesity we have a definite index in regard to the efficacy of dietetic measures in the disappearance of sugar from the urine or in changes of the contour of the patient, we have unfortunately no similar guide in the management of patients afflicted with manifestations of the uric acid diathesis. Moreover, we know very little in regard to its underlying causes, so that the treatment consists chiefly in preventing the increase of circulating uric acid and of the inorganic elements that cause its precipitation in certain points of predilection within the body.

DIET IN GOUT AND URIC ACID DIATHESIS.—We know that uric acid is chiefly formed from disintegrating cell nuclei; consequently the restriction of articles of food containing abundant cell nuclei, nuclein, uric acid or its chemical congeners, the purin bodies, must needs decrease the formation of uric acid, even where the accumulation of uric acid is due to retention or non-destruction and not to over-production. Limitation in the use of uric-acid-forming foods is always rational. On this principle the diet should be selected as follows:

In regard to meats, the mode of preparation and the quantity are more important than the kind of meat. Whereas certain dietetic extremists altogether interdict the use of meats, it is important chiefly to eliminate from the bill of fare merely those meats that contain nucleins or extractives, that is, meats containing many cell nuclei, like the internal organs (liver, sweetbreads, brains, kidneys), meat extracts, broths, sauces

and meat gravies containing the extractives. Furthermore, raw meats, smoked meats, and cured meats, sausage, etc., should be very much limited, as they still contain extractives. There is no difference, popular prejudice to the contrary notwithstanding, in regard to the uric acid content of dark and white meat of birds. And to exclude the flesh of fowl because birds produce more uric acid than mammals is based upon quite erroneous reasoning. Boiled meat is always better than roast or fried meat, because the extractives have been removed from the former.

The quantity of meat should be considerably limited, but not too much, as otherwise the nitrogen equilibrium of the body cannot be maintained. It is, of course, possible to supply all the nitrogen required in articles of food other than meat, but this requires feeding enormous quantities of bulky material and in this way frequently overtaxes an already sensitive digestive apparatus. Unless a little meat is given, there is always danger of chronically underfeeding the patients and in this way favoring the development of gouty cachexias and incidentally producing increased catabolism of body tissues containing abundant nuclein.

There are still greater disadvantages in the feeding of too much meat, first, on account of the marked digestive leucocytosis that follows a copious meat diet with disintegration of abundant leucocytic nuclei; second, on account of the reduction of the blood alkalinity following the catabolism of meat with liberation of sulphur and phosphorus radicles that are oxidized to sulphuric and phosphoric acids. Unless these acids are promptly and completely neutralized by the body bases, the resulting acidulation distinctly favors the precipitation of urates. Corned beef is particularly harmful in this respect, because all the basic salts are leached out in its manufacture and replaced by neutral sodium chlorid. Besides, an abundant meat diet overtaxes the eliminatory powers of the kidneys, organs that should be particularly spared in sufferers from the uric acid diathesis.

While the yolk of egg contains abundant nuclein (vitellin), this nuclein differs chemically from the meat nucleins. And it does not split off uric acid in process of catabolism. The white of egg acts like any other albumin, exercises no effect upon the uric acid excretion and is generally a convenient form in which to administer nitrogen. Hence the white of eggs is permitted.

The nucleins of milk are paranucleins and do not produce uric acid. Hence there is no objection to the use of abundant milk.

The same objections can be formulated against cheese as against corned beef; for in its manufacture the basic alkali salts contained in the

milk become dissolved in the whey. The free fatty acids that it contains coupled with the incomplete neutralization of the sulphuric and phosphoric acid make cheese an "acid" food. It will be found, therefore, that, after an abundant cheese diet, the urinary acidity usually increases. We know furthermore empirically that cheese occasionally precipitates gouty attacks, and that in certain regions of Germany, where much cheese is eaten, urinary calculi are very frequent. Consequently cheese is best excluded from the dietary.

Excessive fat feeding has been known to cause an increased uric acid excretion for reasons that are not understood, unless it be that the fat is so readily oxidized that it prevents the proper oxidation of the nucleins. In uric-acid patients taking much physical exercise, a moderate amount of fat should, however, be added to the diet, as otherwise it is difficult to maintain adequate nutrition.

Carbohydrates, as a group, exercise no effect upon the uric acid excretion, nor do they irritate the kidneys. Inasmuch, however, as many sufferers from the uric acid diathesis have a relatively low carbohydrate tolerance, in other words, a tendency to glycosuria, overfeeding with carbohydrates is bad. Where diabetes or obesity complicates the disease, they should be still further reduced. Wherever dyspeptic symptoms supervene, individual studies must be made and the carbohydrate ration arranged accordingly. Of the fruits and vegetables, all green vegetables and salads should be used copiously. The large residue of cellulose they leave in the digestive tract stimulates the bowel action. The bulbous vegetables, on the other hand, contain a very large percentage of carbohydrate and very little protein. Consequently they possess all the disadvantages of carbohydrate foods and only very slight nutritive value. Celery and onions are to be forbidden, on account of the irritating oils they contain; and the same applies to all spices and condiments, that not only irritate the digestive tract and the kidneys, but also stimulate the appetite and encourage overeating.

Both deciduous and citrous fruits are permitted without restriction. The fruit acid salts they contain are converted into carbonates and aid in maintaining the urinary alkalinity. Empirically they act beneficially in the uric acid diathesis (so-called fruit cures).

Of beverages, water should in all cases be taken in abundant quantities (unless there are distinct clinical counterindications). In patients suffering from cardio-renal disease, and in very obese subjects, it may be necessary temporarily to practice water restriction.

As to mineral waters, the value of the salts they contain is very prob-

lematical; and their effect is probably more suggestive than medicinal.

The use of tea, coffee and cocoa should be materially restricted in uric acid cases. Their caffein, thein, theobromin, adenin, etc., contents are direct precursors of uric acid. They are, moreover, slight irritants of the kidneys. The moderate use of weak tea or coffee is, however, permissible, especially in persons who crave these beverages and have been used to them all their lives. Tea and cocoa are preferable to coffee. Moreover, in alcoholics it is easier to eliminate the use of alcohol, if a little tea or coffee is allowed.

Alcohol on empirical grounds is to be forbidden. Occasionally a patient thrives better if a very small quantity of alcoholic beverage is permitted each day. If alcohol is given at all, it should be administered in the form of dilute Rhine or Mosel wine or claret or whiskey with water, but never as champagne, cider, liqueurs, sweet wine or any of the malted liquors. An alcoholic debauch undoubtedly occasionally precipitates a gouty attack in a predisposed subject. Whereas no distinct and uniform effect of alcohol upon the uric acid excretion has ever been accurately determined, clinical experience distinctly indicates the harmfulness of alcohol in the disorders under discussion.

During the acute attack of gout the diet should consist largely of milk, bread, toast, crackers, cereals, with abundant quantities of water, preferably some alkaline water; and alcohol should be absolutely forbidden.

SECTION II

WILLIAM EDWARD FITCH, M.D.,

Allen Starvation Treatment

Although contrary to the views of the author of this chapter, it is deemed advisable, owing to favorable reports on the starvation treatment of diabetes, to give a brief outline of the Allen treatment. We acknowledge indebtedness to the reports of Allen(1) and his co-workers(2) for much of the material in the section on this subject. Other maladies germane to the subject are cursorily mentioned here for the convenience of the student of sitology.

Hemochromatosis.—Hemochromatosis is a disorder of metabolism characterized by the production of an iron-containing pigment in the glandular organs, and by an increase in the normal pigmentation. This is

associated with a progressive sclerosis of various organs, and in a large proportion of the cases with diabetes. Von Recklinghausen first called attention to this disorder, pointing out that the pigment is hemosiderin or blood-iron found chiefly in the cells of the glands, in the muscle cells of the heart, and in the lymph nodes. There are two groups of cases, the larger one in which diabetes is present, and the smaller one in which there is no sugar in the urine. There is no special dietetic treatment other than the dietetic rules for general health; in patients with sugar in the urine the usual dietetic treatment for diabetes should be religiously adhered to and faithfully carried out.

Ochronosis.—Ochronosis is a rare disorder of metabolism associated with blackening of the cartilages and fibrous tissues, pigmentation of the skin and the presence of dark urine due to alkapton or to derivatives of carboic acid. A well developed case of ochronosis presents a very striking appearance. The discoloration of the fibrous tissues is particularly marked about the knuckles, and in thin individuals the tendons of the hands and feet show bluish-gray through the skin. The cartilages of the ear present a bluish tint and there may be symmetrical black patches on the sclerae. The disfigurement may be very great. There is no special treatment dietetic or otherwise for this condition.

Chronic Rheumatism.—Chronic rheumatism, as stated in the opening paragraph of this chapter, may possibly be due to disturbed metabolism. Our ideas in regard to chronic rheumatism have changed so radically within the last few years that the orthodox views previously held must be discarded. Cases of this disorder are met with, apparently of unknown origin, while others present a strong neurotic element. The term rheumatoid arthritis deserves mention, because it is so commonly used to cover a multitude of errors in diagnosis. There is no uniformity in its usage, for it is applied without discrimination to all types of arthritis and frequently to conditions far removed from joints. There is no disease entity to which the term can be applied other than a chronic affection of the joints. Chronic rheumatism will be considered here as a chronic joint affection developing as a sequel of acute or subacute rheumatism, and therefore correctly termed chronic rheumatism. A larger class of cases, commonly seen in practice, are classed as "rheumatic," but from an etiological point of view have nothing in common with true chronic rheumatism. This "rheumatic" type of cases are those in which the essential pathological change is an inflammatory hyperplasia of the white fibrous tissue in various parts of the body, to which the term "fibrositis" has been very aptly applied. They include the various forms of muscular

rheumatism—lumbago, wry neck, deltoid rheumatism, intercostal rheumatism, rheumatic neuralgia, and chronic villous synovitis.

It was formerly held and taught that the uric acid diathesis was the hand maiden of chronic rheumatism, but this is no longer charged with having any part or parcel in the production of any of the morbid conditions generally referred to as chronic rheumatism.

DIET IN CHRONIC RHEUMATISM.—Unlike gout, this class of affections require no special dieting, other than that usually outlined for any other form of chronic bacterial infection. Moderation should be the motto of all individuals prone to the various forms of fibrositis, and more particularly should they avoid foods which experience has taught them to be most apt to produce gastro-intestinal fermentation. It is not necessary to lay down any hard and fast rules prohibiting such articles as red meats, sugar, jams, bread, fruits, etc., for sufferers from the various forms of fibrositis. All these foods are perfectly wholesome, and unless they produce some form of indigestion or other disturbance, they are not to be tabooed.

Rheumatoid Arthritis.—This condition has not infrequently been mistaken for gout, and whenever such cases are placed upon a restricted and sparse diet as usually outlined for a gouty patient it not infrequently leads to the development of severe and incurable forms of the disease.

DIET IN RHEUMATOID ARTHRITIS.—It is essentially a disease in which an abundance of good wholesome nutritious food is indicated. Through a mistake in diagnosis many patients suffering from rheumatoid arthritis have been placed upon a restricted sparse dietary, which has added to their distress. The diet should be liberal, with an abundance of animal food to be partaken of liberally, but not to excess. A patient should ingest about 125 grams of protein. An abundance of fresh vegetables should form a reasonable portion of the diet. Red meats, potatoes, cauliflower, beans, peas and lentils should be allowed. Their exclusion from the dietary as was formerly the practice was absolutely opposed to the best dietetic treatment of these cases.

Luff(8), an English authority, advocates a moderate quantity of wine or stout with lunch and dinner in these cases; any kind of wine that agrees with the patient is allowed, the preference being for a generous red wine such as Burgundy. In cases where the temporo-maxillary joints are much affected, so as to interfere seriously with mastication, it will be necessary to have the meats minced, pounded, or ground. Cereals will have to be prepared as thick gruels—and vegetables as purées in order to reduce the food to a semi-liquid consistency.

The Allen starvation treatment is based on a plan of treatment reported by Dr. Guelpa(3) of Paris before the British Medical Association in 1910, in which he brought forward the fact that fasting diminishes instead of increases acidosis in diabetes, to the benefit and not to the detriment of the patient. Guelpa's results have been verified by Allen of the Rockefeller Institute of New York City, Joslin of Boston(4), Wood-yatt of Chicago(5), Kellog of Battle Creek(6), and many others. Allen has modified and popularized the treatment. The Massachusetts General Hospital has used this method for several months with great success. In carrying out the Allen treatment, the physician must think in grams of protein, fat and carbohydrate. Simply to cut down the dietary is not sufficient; it must be known approximately how much protein and carbohydrate the patient is ingesting and its total caloric value. The water intake need not be restricted. If there is evidence of acidosis, two drachms of sodium bicarbonate may be administered every three hours. If the breath has a strong acetone odor and the urine gives a strong diacetic acid reaction, sodium bicarbonate is indicated.

The protein allowance in the following dietaries is not large, varying from 35 to 70 grams, and may be ordered according to the needs of the case and the weight of the patient. To prevent monotony and give variety, one meat may be substituted for another, or one 5 per cent vegetable for another. The fat may be increased or diminished by the addition of butter, cream and oil, to furnish calories in sufficient amount to maintain body weight.

The following dietaries are compiled from "The Starvation Treatment of Diabetes," by Hill and Eckman, of the Children's and the Mass. General Hospital, Boston.

ALLEN'S STARVATION DIETARY FOR DIABETICS

Breakfast:

Egg, one; cabbage, 100 grams; tomatoes, 100 grams; butter, 10 grams; coffee, 1 cup; cream, 40%, 1 oz.

Dinner:

Steak, 80 grams; spinach, 100 grams; turnips, 140 grams; egg, 1 white; butter, 5 grams; tea, 1 cup; cream, 40%, 1 oz.

Supper:

Cauliflower, 120 grams; onions, 100 grams; lettuce, 10 grams; olive oil, 5 grams; tea, 1 cup; butter, 10 grams; cream, 40%, 1 oz.

	Grams	Calories
Protein.....	35	157
Fat.....	92	828
Carbohydrates.....	16	72
Total calories.....		1057

Breakfast:

Egg, 1 and 1 white; spinach, 100 grams; cream, 40%, 1 oz.; butter, 5 grams; coffee, 1 cup.

Dinner:

Cabbage, 100 grams; steak, 50 grams; onions, 100 grams; butter, 10 grams; cream, 40%, 2 oz.; tea, 1 cup.

Supper:

Scraped beef balls, 40 grams; celery, 100 grams; cream, 40%, 2 oz.; butter, 5 grams; tea, 1 cup.

	Grams	Calories
Protein.....	40	180
Fat.....	103	977
Carbohydrates.....	20	90
Total calories.....		1247

Breakfast:

Egg, 1; asparagus, 100 grams; butter, 5 grams; cream, 40%, 1 oz.; coffee, 1 cup.

Dinner:

Pork chop, 105 grams; celery, 50 grams; peas, 50 grams; butter, 10 grams; cream, 40%, 2 oz.; tea, 1 cup.

Supper:

Cauliflower, 120 grams; string beans, 100 grams; butter, 5 grams; cream, 40%, 1 oz.; tea, 1 cup.

	Grams	Calories
Protein.....	40	180
Fat.....	105	1000
Carbohydrates.....	22	99
Total calories.....		1279

Breakfast:

Orange, 100 grams; bacon, 50 grams; egg, 1; spinach, 100 grams; butter, 5 grams; cream, 40%, 1 oz.; coffee, 1 cup.

Dinner:

Broth, 180 c.c.; steak, 100 grams; boiled onions, 100 grams; butter, 10 grams; cream, 40%, 2 oz.; tea, 1 cup.

Supper:

Egg, 1; lettuce, 25 grams; bread, 20 grams; cream, 40%, 1 oz.; butter, 10 grams; tea, 1 cup.

	Grams	Calories
Protein.....	50	225
Fat.....	130	1230
Carbohydrates.....	35	157
Total calories.....		1612

Breakfast:

Bacon, 50 grams; egg, 1; turnip, 150 grams; butter, 15 grams; cream, 40%, 2 oz.; coffee, 1 cup.

Dinner:

Steak, 100 grams; celery, 100 grams; cucumbers, 100 grams; lettuce, 100 grams; spinach, 100 grams; olive oil, 25 grams; butter, 20 grams; cream, 40%, 3 oz.; tea, 1 cup.

Supper:

Chicken, 50 grams; turnip, 280 grams; onions, 100 grams; tomatoes, 100 grams; butter, 15 grams; cream, 40%, 2 oz.; tea, 1 cup.

	Grams	Calories
Protein.....	60	270
Fat.....	158	1422
Carbohydrates.....	30	135
Total calories.....		1827

Breakfast:

Grape fruit, 120 grams; bacon, 100 grams; egg, 1; asparagus, 100 grams; bread, 25 grams; butter, 5 grams; cream, 40%, 2 oz.; coffee, 1 cup.

Dinner:

Broth, 180 c.c.; steak, 100 grams; spinach, 100 grams; carrots, 100 grams; butter, 10 grams; cream, 40%, 3 oz.; tea, 1 cup.

Supper:

Egg, 1; lettuce, 100 grams; lima beans, 100 grams; cauliflower, 120 grams; beef juice, 4 oz.; butter, 10 grams; bread, 25 grams; cream, 40%, 2 oz.; tea, 1 cup.

	Grams	Calories
Protein.....	71	320
Fat.....	184	1656
Carbohydrates.....	60	270
Total calories.....		2246

Alimentary Rest Treatment of Diabetes

The treatment of diabetes by alimentary rest is a subject very carefully considered by Leyton(7), whose procedure is as follows: For a couple of days the patient is placed upon a diet poor in fats, e. g., for breakfast—two eggs and some special bread poor in carbohydrates, with a spoonful of jelly made without sugar; a cup of weak tea with a little milk. For lunch—three ounces of lean meat, six ounces of cooked cabbage, two ounces of boiled potatoes, and a small baked custard pudding. For tea—a cup of tea with a little milk and a diabetic biscuit. For dinner—a plate of clear soup; four ounces of fish (excluding salmon, herring

or mackerel), four ounces of green cooked vegetables, an egg, and an orange. After the second day, the patient remains in bed and takes a Seidlitz powder (before breakfast) on an empty stomach. If its action is not satisfactory, an enema is ordered. During this treatment, the breakfast consists of three ounces of clear broth and six ounces of weak tea without milk or sugar; lunch is precisely the same; tea—six ounces of weak tea without milk or sugar; dinner—similar to breakfast with six ounces of weak tea instead of coffee.

Leyton insists that each article of food be prepared as directed, and to have the fluids given in cups that hold no more than the prescribed quantity. Weak coffee is made by pouring ten ounces of boiling water on one or two heaped teaspoonfuls of freshly ground coffee in a jug that has been heated, allowing it to stand five minutes, and then straining. Weak tea is made by pouring ten ounces of boiling water upon one heaped teaspoonful of tea and allowing it to stand for three minutes. Clear broth is made by adding an eggspoonful of meat extract that is not rich in protein to three ounces of boiling water. A vegetable is to be boiled in at least four times its weight of water; after it is fully cooked, it is to be freed from water and weighed, then stewed for a quarter of an hour in a little clear broth and flavored with pepper and salt to taste. When it is to be cooked in several changes of water, two saucepans are necessary; when it is partly cooked in one it is transferred to the boiling water in the other. Cabbage boiled in three waters may replace French beans in the following dietary, which is started when the urine is free from sugar:

DIETARY FOR ALIMENTARY REST IN DIABETES

FIRST DAY—Seidlitz powder before:

Breakfast:

Six ounces of weak coffee without milk or sugar; three ounces of cooked French beans.

Lunch:

Six ounces of weak coffee without milk or sugar; four ounces of cooked French beans.

Tea:

Six ounces of weak tea without milk or sugar.

Dinner:

Six ounces of weak tea without milk or sugar; three ounces of cooked French beans.

This dietary contains approximately: carbohydrates, 6 grams; protein, 3 grams; fat, 4 grams; total calories, 72.

SECOND DAY—Seidlitz powder before:

Breakfast:

Six ounces of weak coffee without milk or sugar; seven ounces of cooked French beans; one boiled egg.

Lunch:

Seven ounces of cooked French beans; one boiled egg.

Tea:

Six ounces weak tea without milk or sugar.

Dinner:

Seven ounces of cooked French beans; one boiled egg.

This dietary contains approximately: carbohydrates, 11 grams; protein, 23 grams; fat, 22 grams; total calories, 334.

THIRD DAY—Seidlitz powder before:

Breakfast:

Six ounces of weak coffee with one teaspoonful of cream; one boiled egg; seven ounces of raw lettuce.

Lunch:

One egg; seven ounces of cooked cucumber.

Tea:

Six ounces weak tea with one teaspoonful of cream.

Dinner:

Seven ounces of cooked French beans; one egg.

This dietary contains approximately: carbohydrates, 16 grams; protein, 24 grams; fat, 21 grams; total calories, 349.

FOURTH DAY—Seidlitz powder before:

Breakfast:

Six ounces weak coffee with a teaspoonful of cream; one boiled egg; seven ounces of raw lettuce.

Lunch:

Seven ounces of cooked cabbage; one egg.

Tea:

Six ounces of weak tea with a teaspoonful of cream, no sugar.

Dinner:

Seven ounces of cooked French beans; one egg.

This dietary contains approximately: carbohydrates, 21 grams; protein, 25 grams; fat, 21 grams; total calories, 373.

FIFTH DAY—Seidlitz powder before:

Breakfast:

Six ounces weak coffee with a teaspoonful of cream; one egg; seven ounces raw lettuce.

Lunch:

One ounce cooked lean meat; seven ounces cooked cabbage.

Tea:

Six ounces weak tea with a teaspoonful of cream; no sugar; one egg.

Dinner:

Eight ounces clear soup; one egg; seven ounces cooked French beans.

This dietary contains approximately: carbohydrates, 21 grams; protein, 38 grams; fat, 23 grams; total calories, 442.

SIXTH DAY:

Breakfast:

Six ounces weak coffee with one teaspoonful of cream, no sugar; one egg; seven ounces raw lettuce.

Lunch:

Three ounces cooked lean meat; four ounces boiled French beans; one and a half ounces boiled potatoes.

Tea:

Six ounces weak tea with one teaspoonful of cream, no sugar; one egg.

Dinner:

Three ounces of cooked French beans; three ounces of cooked cabbage; one egg.

This dietary contains approximately: carbohydrates, 25 grams; protein, 50 grams; fat, 29 grams; total calories, 561.

SEVENTH DAY—a fast day. Seidlitz powder first thing in the morning.

Breakfast:

Three ounces clear soup; six ounces weak coffee without milk or sugar.

Lunch:

Three ounces clear soup; six ounces weak coffee without milk or sugar; one egg.

Tea:

Six ounces weak tea without milk or sugar; one egg.

Dinner:

Three ounces clear soup; six ounces weak tea without milk or sugar.

This dietary contains approximately: carbohydrates, 25 grams; protein, 50 grams; fat, 36 grams; total calories, 627.

EIGHTH DAY:

Breakfast:

Six ounces weak coffee with one teaspoonful of cream; one egg; one ounce of cooked fat bacon; seven ounces of raw lettuce.

Lunch:

Two ounces of cooked lean meat; four ounces cooked French beans; one and a half ounces boiled potatoes.

Tea:

Six ounces weak tea with one teaspoonful of cream, no sugar; one egg.

Dinner:

Eight ounces clear soup; one egg; three ounces cooked cabbage; three ounces cooked French beans.

This dietary contains approximately: carbohydrates, 25 grams; protein, 51 grams; fat, 41 grams; total calories, 673.

NINTH DAY:

Breakfast:

Six ounces weak coffee with one teaspoonful of cream, no sugar; one egg; two ounces cooked fat bacon; seven ounces raw lettuce.

Lunch:

One and a half ounces cooked lean meat; four ounces cooked French beans; two ounces boiled potatoes.

Tea:

Six ounces weak tea with one teaspoonful of cream, no sugar; one boiled egg.

Dinner:

Ten ounces clear soup; one egg; three ounces cooked French beans; three ounces cooked cabbage.

This dietary contains approximately: carbohydrates, 28 grams; protein, 54 grams; fat, 54 grams; total calories, 814.

TENTH DAY:

Same as the ninth, except for the addition of an ounce of butter to the vegetables. Total calories, 1,039.

ELEVENTH DAY:

Breakfast:

Six ounces weak coffee with one teaspoonful of milk, no sugar: one egg; two ounces cooked fat bacon; seven ounces raw lettuce.

Lunch:

One and a half ounces cooked lean meat; four ounces cooked French beans; one ounce boiled potatoes; one-half ounce butter.

Tea:

One-half ounce white bread; six ounces tea with one teaspoonful of milk or cream; one-half ounce of butter; one egg.

Dinner:

Eight ounces clear soup; one egg; three ounces cooked cabbage; three ounces cooked French beans; one-half ounce butter.

This dietary contains approximately: carbohydrates, 31 grams; protein, 54 grams; fat, 90 grams; total calories, 1,150.

TWELFTH DAY:

Same as the eleventh, with the addition of one ounce of butter. Total calories, 1,375.

THIRTEENTH DAY:

To the diet of the eleventh day add two ounces of butter and half an ounce of white bread, taking care to spread the carbohydrates equally over the four meals. Not more than a half ounce of bread at each meal. Total calories, 1,660.

FOURTEENTH DAY:

Is a fast day, with a diet in every respect similar to that of the seventh day.

FIFTEENTH DAY :

Similar to the thirteenth. From this time on, the increase in the diet should consist of one ounce of boiled potato on alternate days, or, if the patient prefers, a quarter ounce of bread may be added on alternate days instead. A further increase of one ounce of butter or fat should be made on the twentieth day. The twenty-first day should be one with a modified diet. Bread and potatoes should be withheld.

When sugar reappears in the urine, the patient must fast until it disappears again; usually thirty-six hours suffice. The carbohydrate is reduced to one-half of that which was in the diet, and then increased very slowly five grams a week until the sugar appears again. The second limit must be recognized as the amount which is too much for the patient, and not more than three-quarters should be given in the food for several months. Many diabetics manifest glycosuria on being given an excess of protein; then the limit must be found and the diet arranged so that not more than three-quarters of the amount is given.

Reducing Dietaries

The reducing dietaries of Banting, Oertel, Ebstein and others cursorily alluded to above have been advocated by their authors for the treatment of obesity. Their advantages and disadvantages must be carefully taken into consideration before adopting any one of them.

Banting's Obesity Dietary was devised for him by Dr. Harvey. It consisted of animal food, 13-16 ounces; bread, 2 ounces; fruit and vegetables, 6-12 ounces; total fluid, 35 ounces.

BANTING'S REDUCING DIETARY

9 A.M. A large cup, 9 oz., of tea without milk or sugar; 1 oz. of toast or a little biscuit; 4-6 oz. of beef, mutton, kidneys or broiled fish.

2 P.M. Two or three glasses, 10 oz., of claret, sherry or Madeira; 1 oz. of dry toast; 5-6 oz. of lean meat, poultry, game or fish; any vegetable except potato, parsnip, carrot, turnip or beetroot; unsweetened cooked fruit out of a pudding.

6 P.M. A large cup of plain tea, 9 oz.; 2 or 3 oz. of cooked fruit, and toast or a rusk or two.

9 P.M. A glass or two, 7 oz., of claret or sherry and water; 3 or 4 oz. of meat or fish as at dinner.

A glass of grog, without sugar, or a glass or two of claret or sherry may be allowed as a nightcap.

Not allowed: Pork or veal; eels, salmon and herrings; champagne, port and beer; certain vegetables above mentioned.

Elbstein's diet is a modification of Banting's, containing more fat and less protein. The carbohydrates are much restricted, but a liberal allowance of fat is given on the grounds that it is more satisfying and less fattening.

EBSTEIN'S REDUCING DIETARY

- 6-7.30 A.M. Plain tea, 8-9 oz., and 2 oz. of well-toasted bread with plenty of butter.
 2 P.M. Soup, made with beef marrow; fat meat, $4\frac{1}{2}$ to $5\frac{1}{2}$ oz., with fat sauce; green vegetables; fresh fruit; 2 or 3 glasses of a light white wine.
Tea: Same as at breakfast. Or, merely a cup of plain tea is allowed after the midday meal.
 7.30 P.M. Tea; one egg; fat roast meat or ham; smoked fish; 1 oz. of bread with plenty of butter; a little cheese; fresh fruit.

OERTEL'S REDUCING DIETARY

MINIMUM DIET

MAXIMUM DIET

7-8 A.M.

Coffee, 120; milk, 30; 2 soft-boiled eggs or lean meat, 50-100; bread, 25.

This contains the same as the minimum diet and certain additions.
 Meat, 100; butter, 12; bread, 35-70.

10-11 A.M.

Clear soup or water, 100; or port wine, 50; cold meat or lean ham, 50; rye bread, 20.

Or light wine, 100.

1 P.M.

Wine and water, 200; soup, 0-100; roast beef, 150; or beef boiled with fat, 150; green salad, 25; green vegetables, 50; farinaceous pudding, 100; or rye bread, 20; fresh fruit, 100.

Wine, 250.
 Beef, 50 more.
 Salad, 25 more.
 Roll of bread, 25.

4 P.M.

Coffee, 80; milk, 20.

Coffee, 120; milk, 30.

Evening:

Wine, 200, or water, 250; 2 soft-boiled eggs or lean roast meat, 150; salad, 25; rye bread, 20; cheese, 15; fruit, 100.

Wine, 250; water, 100-150; caviar, 12, or smoked salmon, 18; game, fowl or beefsteak, instead of roast beef, 150.

NOTE.—The quantities are given in grams. One ounce is equivalent to 30 grams. Saccharin is used for sweetening. Fruit is not always allowed. The diet is combined with exercises, active or passive, to strengthen the heart. In fatty accumulation about this organ the amounts of liquid, fat and carbohydrates in the diet are still more reduced.

VON NOORDEN'S REDUCING DIETARY

- 8 A.M. Cold lean meat, 3 oz.; bread, 1 oz.; tea or coffee, with a spoonful of milk and no sugar.
- 10 A.M. One egg.
- 12 M. A cupful of strong soup without fat.
- 1 P.M. A small plate of clear soup; lean meat or fish, 5 oz.; potato, $3\frac{1}{2}$ oz.; green vegetables; fresh fruit, $3\frac{1}{2}$ oz.
- 3 P.M. A cup of black coffee.
- 4 P.M. Fresh fruit, 7 oz.
- 6 P.M. A glass of skimmed milk.
- 8 P.M. Cold lean meat, $4\frac{1}{2}$ oz., with pickles; graham bread, 1 oz.; 2-3 spoonfuls of fruit cooked without sugar.
- Two glasses of wine are allowed daily.

Reference to the preceding tables enables one to draw up a diet suitable for the obese in quantity and variety, without containing an undue proportion of nutritive material. The following dietary may be adopted as a basis, being modified according to the bulk and age of the patient, the mode of life, and the progress of the case.

CAUTLEY'S SPECIAL REDUCING DIETARY

Before Breakfast—7-7.30 A.M.

One orange, apple or pear; half a pint of water.

Breakfast—8-8.30 A.M.

Tea, 5-6 oz.; milk, $\frac{1}{2}$ oz.; sweetened with saccharin; one or two boiled or poached eggs; dry toast or bread, $1\frac{1}{2}$ oz.; butter, $\frac{1}{4}$ oz.

Lunch—11-11.30 A.M.

Clear soup or buttermilk, 8-10 oz.

Dinner—1-1.30 P.M.

Cold fowl, game, lean meats, ham or tongue, or hot lamb cutlet or sweetbread, 3-4 oz.; salad, 1 oz.; Dutch cheese, $\frac{1}{4}$ oz.; celery, radishes, etc.; rye, brown, bran or gluten bread, $\frac{1}{2}$ to 1 oz.; butter, $\frac{1}{2}$ oz.; fresh fruit or water, 4-6 oz.

Tea—4.40 P.M.

A large cup of plain tea, with a dessertspoonful of milk; one piece of dry toast or bread and jam, or eaten with lettuce, mustard and cress, or tomato.

Supper—7.30 P.M.

Clear soup, 4 oz.; fish, cooked without butter, or any kind of meat, game or poultry, except pork, 4-6 oz.; green vegetables, of a caloric value not exceeding 5 per oz., *ad lib.*, or smaller amounts of those with a higher caloric value, say 1-2 oz.; farinaceous pudding, 3-4 oz.; watermelon or the cooked unsweetened fruit out of a tart; dry toast or various breads, 1 oz.; butter, $\frac{1}{4}$ oz.; water, 4-6 oz.; a glass of hot water at bedtime.

Other reducing dietaries will be found in Volume III, Chapter XXVIII, page 803.

REFERENCES

1. ALLEN. Reports of the Rockefeller Institute, New York.
2. HILL and ECKMAN. The Starvation Treatment of Diabetes, Wm. Leonard, Boston, Mass., 1916.
3. GUELPA, G. A New Fasting Treatment for Diabetes, Rebman Co., New York.
4. JOSLIN, E. P. Joslin's Treatment of Diabetes Mellitus, Lea & Febiger, Philadelphia.
5. WOODYATT. N. York Med. J., 1916.
6. KELLOG, J. H. The New Method in Diabetes.
7. LEYTON, O. F. Practitioner, London, Nov., 1916.
8. LUFF. Sutherland's System of Diet and Dietetics.

CHAPTER XIII

DIET IN DISEASES OF THE DUCTLESS GLANDS

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General Considerations.

Dietetic Management of Endocrine Disorders.

Functional Disorders of the Ductless Glands: Hyperthyroidism; Hypothyroidism—Relation of Thyroid Insufficiency to Constipation; Pituitary Dyscrasias; Hyperthymism—Metabolism Study of Goiter; Addison's Disease.

Remineralization.

GENERAL CONSIDERATIONS

The ductless glands are special vascular structures found in the head, neck and trunk. They include the pituitary, the thyroid, the parathyroid glandules, the thymus and the coccygeal bodies; certain glandular structures in the alimentary canal; the spleen and the adrenal glands. The place these structures should occupy in an anatomical system is subject to dispute. From the data furnished by embryology, the spleen, the solitary and agminated bodies of the small intestine, the tonsil, and other adenoid structures of the alimentary canal are shown to be closely related to the lymphatic system, while the pituitary body in part, the thyroid body, the thymus body and the coccygeal body are developed from the hypoblast of the embryo in association with the primitive alimentary tract, and while presenting some features in common with the lymphatic system, form a distinct group.

The adrenals and the coccygeal bodies are abundantly supplied with branches of the sympathetic nerve, and are included by Luschka in a group of appendages to the nervous system. The adrenals are developed in intimate association with the sympathetic ganglia, and each retains a medullary substance rich in nerve cells.

The ductless glands are all very vascular, and from the circumstance that they bear functional relations to the composition of the blood corpuscles, both red and white, as well as in some instances (*e.g.*, the spleen

and the thyroid body) holding secondary positions as blood diverticula or reservoirs, are named by some observers appendages to the blood-vessel system, or blood-vessel glands (*Blutdrüse*).

There are several glandular structures in the body that are now known to have a dual function. Besides their external secretion, they produce an equally important series of substances which, because of their humoral distribution, are properly called *internal secretions*. Principal among these are the essential sex glands (gonads), the pancreas and the mammae. Undoubtedly other structures exert a decided influence upon the humoral make-up, and some observers, especially in France, class the liver and even the kidneys as an essential part of the endocrine system.

The functions of the ductless glands are in a measure supplemented in the fetus by the liver, and in the adult by the medulla of bone. The lymphatic glands, together with the ductless glands, are more active during infancy and adolescence, though they exert an important influence upon practically all the functions of the body throughout life.

DIETETIC MANAGEMENT OF ENDOCRINE DISORDERS

While the dietetic management of disorders of the glands of internal secretion in most instances is purely an adjuvant measure, it is often none the less an important part of the treatment. Diabetes mellitus is the principal exception to this statement, for diabetes is unquestionably controlled best by dietetic treatment (*see* Chapter XII), and it, too, is undoubtedly an endocrine disorder. The hormone-producing organs are very intimately connected with nutrition, for the ductless glands are responsible for the regulation of metabolism, and consequently nutrition, growth and development are dependent upon their harmonious function. Deranged endocrine function means disturbed nutrition, and hence efforts to facilitate the reëstablishment of the normal activities of the glands of internal secretion may be profitably associated with measures calculated to influence nutrition, and *vice versa*.

The control of nutrition—largely possible by careful attention to the amount and kind of food given—is an important factor in the treatment of disturbances due to internal secretory dyscrasia.

FUNCTIONAL DISORDERS OF THE DUCTLESS GLANDS

It is customary to divide functional disorders of the glands of internal secretion into two principal classes, *i.e.*, those in which excessive activity

of one or more of the glands is present, and the opposite class where the chief manifestations are due to endocrine insufficiency. Naturally, the dietetic treatment, like all other forms of treatment of disorders of this character, depends entirely upon the increase or diminution of the physiological activities of the glands.

Hyperthyroidism.—The best-understood endocrine gland is undoubtedly the thyroid, and some suggestions as to the dietetic regulation of thyroid disorder will follow. In the conditions which accompany thyroid excess (hyperthyroidism, thyrotoxicosis, Graves' disease, Basedow's disease or exophthalmic goiter are included in this class), the metabolic processes are increased and oxidation is more rapid than normal. This is probably the chief factor responsible for the loss in weight, which so generally accompanies this disorder; and obviously, in addition to attempting to reduce the activities of the unruly thyroid, it is necessary to enhance nutrition as best we may.

DIETETIC MANAGEMENT IN HYPERTHYROIDISM.—The usual dietetic rule in such conditions is, wherever possible, to increase judiciously the amount, and especially the assimilation, of the food. There is a need for from 10 per cent to 50 per cent more food than the usual standard, and it is also possible to increase its digestion and absorption by the administration of pancreatin, for the need for this hyperalimentation does not necessarily imply that the digestive or assimilative capacity is increased. In addition to the effect of pancreatin upon digestion, it has been suggested that the adrenal irritability and sympatheticotonus, invariably a part of the syndrome of thyroid excess, may be favorably affected by increasing pancreatic activity, since the pancreas hormone antagonizes that of the adrenals and possibly also the thyroid. At least pancreatin (15 to 30 grains a day) has been given with clinical advantage in conditions of this character. On the contrary, digestive disturbances not infrequently complicate thyroid excess, especially late in its course; hence particular care must be exercised not to overtax the alimentary organs.

The dietetic management of thyroid excess attempts to introduce foods of easy digestibility and high caloric value. The salads, vegetables and bulky but not especially nutritious foods are advantageously replaced in part by other combinations in which cream, eggs and butter are among the more important ingredients. Usually the writer has found that farinaceous puddings, especially rice, in which cream and eggs are generously used, are preferable to less nutritious and not more tasty desserts.

Generally speaking, meats are not the most desirable foods for those suffering from thyroid irritability, for the purins undeniably present in

flesh foods not only stimulate the thyroid (for this organ happens to be an important part of the detoxicating system of the body), but obviously are no advantage to an organism already "on edge" from an excess of a purin-like toxin of marked activity. In fact, it is the writer's opinion that meat should be prescribed or at least allowed only occasionally, and then only in small amounts.

On the other hand, it is a routine custom in this condition to advise some supplementary feeding, and buttermilk and ice cream serve this purpose very well. In addition to three good meals at the usual hours, I usually prescribe a pint of buttermilk (natural or cultured with the *B. bulgaricus*) two hours before lunch, and from four to six ounces of ice cream in the afternoon at about four o'clock.

Hypothyroidism.—In this condition, the cell activities are much below par, digestive activity is sluggish, muscular tonicity is decreased and constipation is the rule. The most usual single accompaniment of hypothyroidism, be it well-marked cretinism or myxedema or the less definite "minor thyroid insufficiency"—which, by the way, is said to be "as common as the exanthemata," though too often it is not discovered—is *infiltration*. This means that the cells throughout the body are overburdened with their own wastes and are distended, just as we expect to find the skin puffy, inactive and infiltrated in *myxedema*. This reduces the sensitiveness of the organism and naturally the digestive system is not immune, for in fact the secretory cells are infiltrated and cannot perform their proper service, the musculature of the intestine is infiltrated and flabby, intestinal stasis is the rule, and while the weight of the individual may be above normal, it is an unhealthy weight and is a great discomfort to the patient.

RELATION OF THYROID INSUFFICIENCY TO CONSTIPATION.—In this connection it may be of interest to emphasize the important relationship which thyroid insufficiency bears to constipation. Dr. Leopold Levi of Paris, whose work and writings, with Baron Henri de Rothschild, on the thyroid gland are well known, refers to the intimacy of constipation and hypothyroidism in the following terms: "*La constipation thyroïdienne est fréquente et peut-être la plus fréquente des constipations*" ("Constipation of thyroid origin is frequent, and, perhaps, the most frequent form of constipation"). This being the case, and clinical experience confirms the fact that thyroid insufficiency is very often discovered in those having chronic constipation, not only should patients suffering from thyroid insufficiency be treated from a dietetic standpoint, but physicians well versed in the management of these cases might profitably establish to their

satisfaction that there is a thyroid element in a given case and supplement the dietetic and other treatment by the judicious administration of thyroid extract. Such cases may benefit greatly from one-fourth to one-half a grain of thyroid extract (U.S.P.) three times a day during every other week, in addition, of course, to other indicated treatment.

DIET IN HYPOTHYROIDISM.—As a general rule, the best advice regarding diet in hypothyroidism includes the suggestion that food combinations be as simple as possible and that the high caloric foods be replaced in a measure by cellulose-containing foods and bran, for not only is this bulk useful in combating the stasis and muscular insufficiency in the bowels, but it facilitates the reduction of the ration.

After a few days of limited diet or even starvation, provided the patient is able to stand it, the caloric value of the food prescribed should approximate that necessary for a normal individual of the same height; in other words, since hypothyroid cases commonly are obese and heavier than proper, their actual weight is no index of their need of nourishment. Further, since many individuals with varying grades of this disorder, especially the more decided cases, exhibit mental and physical peculiarities, one often finds in them a tendency to overeating which should be curbed promptly, for this habit, uncontrolled, undoubtedly complicates the constipation, adds to the toxemia and favors the obesity.

A morning meal of apples alone has been suggested by me many times with clear-cut benefit. The patient is instructed to eat three or four moderate sized apples, raw, stewed or baked, and to take nothing else till lunch. Raw apples are preferable since there is no need for added sugar, nor is there the imaginary need for cream, etc. Occasionally, hunger is great by the middle of the forenoon, especially in persons whose hands and minds are not fully occupied, and here it may be well to allow a glass of buttermilk.

For lunch a bulky meal of low caloric value with plenty of greenstuffs seems to be the best, and the supper is as scanty as the temperament and willingness of the individual will permit. The total caloric content of the day's food may be from 30 to 60 per cent lower than the average, and this may be continued for some weeks, the amount and caloric value of the food being very gradually increased as the weight and other symptoms respond to the regimen.

Pituitary Dyscrasias—**DIET IN DYSPITUITARISM.**—The dietetic management of dyscrasias of endocrine origin in which a pituitary, adrenal or gonad element preponderates, differs little from that outlined above for hyperthyroidism. It may be taken as axiomatic that one cannot have a dis-

order of one of these glands without associate disturbances in the remainder of the ductless glandular chain. Polyglandular disorder is the rule. Hence there are no particular rules for accomplishing desired therapeutic results by means of diet in hyperpituitarism (acromegaly), save to follow the suggestions made in the section dealing with hyperthyroidism, provided metabolism is excessive and other things are equal. In hypopituitarism, however, especially in the syndrome known as "*dystrophia adiposo-genitalis*," so named by Fröhlich and Bartels and sometimes called "*Fröhlich's disease*," the need for calorie limiting is often just as great as in cretinism, and in the better defined forms of thyroid insufficiency with obesity. Pituitary patients are often great eaters, and sometimes erratic and difficult to control; but coöperation on the part of the head of the culinary department sometimes permits their tendencies to have their full swing, while their actual food intake is limited with ultimate advantage.

It should be remembered that one of the common metabolic signs of pituitary insufficiency is an increased carbohydrate tolerance evidenced by the facility with which abnormally high quantities of glucose are assimilated. As a result of this, these cases usually show a "sweet tooth," and in the writer's opinion this should not be curbed as much as some have hinted, for here the body has accustomed itself to the increased amount of sugar and from a chemical standpoint is well able to care for it.

Hyperthymism.—The thymus is a ductless gland located in the superior mediastinum and lower parts of the neck. Nothing very definite can be said of its functions, except perhaps that the gland is concerned in some way with growth and development. It is thought to furnish an internal secretion, but of undetermined nature and action, and in early life, at least, this secretion influences in an important way some phases of metabolism. This gland, contrary to former teaching, retains its size and presumably its full physiological activity until puberty or after. Thenceforward it gradually undergoes retrograde changes, but apparently throughout life some remnants of thymus tissue remain imbedded in fat. Under pathological conditions, more of this residue may remain than normal, or there may be a real hypertrophy together with an overactivity, as a complicating factor in certain forms of exophthalmic goiter. (The reader is referred to the dietetic suggestions under that heading.)

THE METABOLISM STUDY OF GOITER.—A metabolic study of goiter was made by Halverson, Bergeim, and Hawk of Philadelphia, to determine the effect of thyroid and thymus treatment on the metabolism of

nitrogen, phosphorus, sulphur calcium and magnesium, on a patient with exophthalmic goiter and apparently a slight hypothyroidism. The patient responded readily to treatment. This observation was made in five periods of five days each, including periods of thyroid and thymus treatment.

In the preliminary period without treatment a marked disturbance of metabolism was noted, with pronounced losses of nitrogen, phosphorus and magnesium and a practical balance of calcium and sulphur. Thyroid treatment markedly stimulated the metabolism of all elements determined, this stimulation continuing long after treatment was stopped. Considerable retention of all elements was brought about, the maximum effect being reached sooner in the case of calcium and magnesium than in the case of nitrogen, sulphur and phosphorus. The effect of thymus administration on the metabolism was less marked than that of thyroid, but appeared to be distinct. In the thymus period the retention of all elements was depressed. When thymus administration ceased, the rate of retention for all elements immediately increased. Thus thymus treatment appeared to depress the stimulating effect of the thyroid on metabolism, which supports the view of a possible antagonistic action of these glands, such as has been suggested by others on the basis of indirect evidence. The administration of thyroid caused diuresis immediately. Thymus treatment had the opposite effect, leading to a retention of water, with marked decrease in urine volumes on constant water ingestion. The weight of the patient decreased on thyroid treatment and increased after withdrawal and on thymus administration. Following thyroid treatment there was a progressive decrease in urinary indican excretion. This may indicate lessened intestinal putrefaction.

Experiments have shown that when the thymus is removed, less thyroid suffices. The secretions of the thymus are of importance in the nitrogenous and calcium metabolism of children. There is a deficiency of thymus secretion in marasmus, wasting, rickets, delayed development and osteomalacia. This secretion is said to neutralize some element of the thyroid secretion. In the absence of the thymus gland, the thyroid does not have to work at such high pressure; in consequence, there is a diminished retention of calcium, phosphorus and nitrogen. Therefore, in disorders in which there is a deficiency of thymus secretion, the thyroid is the gland to stimulate. Such a condition calls for the following foods: oatmeal and milk, meat juice, raw minced liver, meat extracts, graham bread, whole meal bread, and other foods which stimulate the thyroid. Thyroid extract and thymus gland are indicated. Restrict farinaceous foods.

Addison's Disease.—The adrenal glands, or, anatomically speaking, the adrenal capsules, together with the accessory adrenal bodies, form the

chromaffin system. Brown-Séquard, in 1856, was the first to show that removal of these glands is followed rapidly by death of the patient or animal. The fatal outcome is more rapid than in the case of the removal of the thyroids, death following the operation in two or three days, or, according to some published reports, in a few hours.

The endocrine secretion from the adrenals exerts a marked influence on nutrition. This secretion also keeps up the cardiac tone and the vascular tone by its influence on all involuntary muscular fibers. It also promotes the retention of calcium. The adrenal and thyroid glands seem to stimulate one another; but the action of the chromaffin hormone is somewhat inhibited by the pancreas. Hyperglycemia and glycosuria occur when the pancreas is removed.

Addison's disease is invariably associated with a hypofunction of the adrenals. The treatment of the disorder is on the whole rather unsatisfactory. As yet no observations have been conducted to explain the relations existing between the adrenals and human metabolism. The production of adrenin by the medullary substance of the adrenal—the presence of which in the blood coming from these glands may be accepted as proved—is not the only function of the adrenals. Biedl and others think it possesses the function of neutralizing various noxious principles arising in the body. Undoubtedly also certain radical changes in the chemical relations of the body are related to the adrenal glands as shown by the sex changes accompanying adrenal tumors (hypernephromata) and the hirsutism and sex reversions of virilism.

DIET IN ADDISON'S DISEASE.—In surveying these metabolic researches, the impression is obtained that patients with Addison's disease—always persons in a seriously reduced state of health—can easily hold their ground on a normal or even on a sparse diet, but the writer would suggest and urge a nourishing dietary, light and easily digested, but allowed in abundance. If any irritation of the gastric mucosa with vomiting is present, iced champagne, albumin water, lime water and milk, peptonized milk and Valentine's Beef Juice may be given in small quantities until the tendency subsides. Scraped beef, pounded chicken or fish then may be allowed, with such indicated medication as may be desirable to facilitate digestive activity.

These patients usually gain in nitrogen weight and richness of ash upon a full diet. Assimilation in the intestine is normal, unless disturbed by diarrhea. According to many observers, the administration of total adrenal gland exerts a favorable influence, and it is recommended in doses of from one to three grains four times a day. If the diarrhea is of a

chronic type, the patient should be put upon the treatment outlined in Chapter III of this volume.

I know of no special diet that is unusually beneficial in conditions of endocrine disorder of the gonads or the adrenals. On general principles, conditions of excess demand an antitoxic diet and the limitation of all foods likely to irritate any of the glands of internal secretion. Insufficiency spells general systemic inadequacy, and digestion being reduced, the diet should be as simple, well-cooked and as properly combined as possible. In Addison's disease, careful attention to feeding is essential, for there is usually extreme asthenia, which is not merely muscular, but affects also secretions and cell activity generally.

REMINERALIZATION

Remineralization.—In nutritional disorders in which the endocrine glands are functionally deranged, it will be found that the mineral metabolism is disturbed. It may not be possible accurately to measure this, nor to state with precision which salts are wanting, but malnutrition invariably includes *mineral* malnutrition. In many chronic disorders of nutrition, of which, perhaps, tuberculosis is the most common typical example, "remineralization" (as the French call it) is as much a part of the treatment as immunization, hygiene, or what not.

Whether the demineralization is due to endocrine disorder or whether the endocrine disorder may be aggravated by it, it is clinically true that the administration of suitable mineral salts by dietetic regulation is profitable, because it is rational. This may be accomplished in the following manner:

REMINERALIZATION DIET.—A vegetable consommé is prepared by simmering various and differing combinations of vegetables. These include selections of greenstuffs such as spinach, beet or turnip tops, celery including the small leaves, celeriac, young peas (with the pods), string beans, tomatoes, potatoes, turnips, and for that matter, almost any vegetable. These are cut up, covered with water and cooked sufficiently long to extract the salts; the writer prefers a fireless cooker for this purpose, heating the vegetables for fifteen minutes and leaving them all night in the cooker. The water with its flavor and saline constituents, instead of being thrown away, is served hot or cold and may be jellied or frozen. This preparation may be modified greatly as to flavor and form, and is a palatable and valuable food in numerous nutritional disorders of infants and adults.

BIBLIOGRAPHY

- COBB, IVO GEIKIE. *The Organs of Internal Secretion—Their Diseases and Therapeutic Application*, London, 1917, pub. by Baillière, Tindall & Cox.
- FALTA, WILHELM. *The Ductless Glandular Diseases* (translated by M. K. Myers), Philadelphia, 1916, pub. by P. Blakiston's Son & Co.
- HALVERSON, J. O., BERGEIM, O., and HAWK, P. B. A Metabolism Study of Goiter, *Arch. Int. Med.*, 1916, xviii, p. 800.
- HARROWER, HENRY R. *Practical Hormone Therapy, a Manual of Organotherapy for General Practitioners*, London, 1914, pub. by Baillière, Tindall & Cox.
- . *The Internal Secretions in Practical Medicine*, Chicago, 1917, Chicago Medical Book Co.
- . Some Remarks on the Treatment of Hyperthyroidism, *Amer. J. Clin. Med.*, 1917, xxiv, p. 264.
- HERTOGHE, EUGENE. De l'hypothyroïdie benigne et chronique ou myxœdème fruste, *Bull. Acad. roy. de med. de Belg.*, 1899, xiii, p. 231.
- LEVI, LEOPOLD, and DE ROTHSCHILD, H. *La Petite Insuffisance Thyroïdienne et son Traitement*, Paris, 1913, pub. by O. Doin et Fils.

CHAPTER XIV

DIET IN UNCLASSIFIED DISEASES

W. A. NEWMAN DORLAND, A.M., M.D., F.A.C.S.

Exophthalmic Goiter: The Pathogenesis of the Disease in its Bearing on Diet; Dietetic Suggestions.

Hodgkins' Disease: Nature of Hodgkins' Disease.

Myxedema and Cretinism: Pathogenesis of Myxedema; Dietetic Suggestions in Myxedema and Cretinism.

Osteomalacia: Pathogenesis of Osteomalacia in its Relation to Dietetics; Dietetic Management of Osteomalacia.

Syphilis: Nature of Syphilis.

EXOPHTHALMIC GOITER

It has not as yet been positively determined just where in nosology exophthalmic goiter (hyperthyroidism, dysthyroidism, thyrotoxicosis) should be grouped. Hitherto, on account of the evident disturbance of the nervous system, as manifested by the tremors and other clinical phenomena, it has been customary to classify it among the diseases of this system. With our rapidly increasing information concerning the ductless glands, and the physiology and pathology of the internal secretions, it is quite possible that Graves' or Basedow's disease may ultimately find its place among the diseases of these special glands or among the auto-intoxications of the body. This uncertainty in classification is due to the fact that the real cause of exophthalmic goiter is as yet unexplained.

The Pathogenesis of the Disease in its Bearing on Diet.—It is possible to determine the etiologic development of the symptoms, and by deduction to arrive at fairly satisfactory dietetic rules for regulating them. Thus, for the most part, the symptoms may be referred to an overactivity on the part of the thyroid gland, a *hyperthyroidism*, the cause of which is not known, but which is probably dependent upon some central nervous derangement. This etiology is suggested by the frequent association of Graves' disease with disturbances and alterations in the functions of other

ductless glands, a coördination being observed between these changes and the hyperthyroidism.

The tachycardia is due to a toxic irritation of the cardiac accelerators; and the normal or lowered blood pressure which is characteristic of the disease (*Spiethoff, Donath, et al.*) is due to an abnormal laxity of the tonicity of the peripheral vessels resulting from toxic irritation of the vasodilators.

The gastro-intestinal disturbance, which is very pronounced in certain cases, may also be attributed to the toxicosis. Thus, according to Sattler, *vomiting* occurs in 15 per cent of the cases; it occurs generally in paroxysms which bear no relation to the ingestion of food; it is often not preceded by nausea. Profuse painless and watery *diarrhea* is much more common, occurring, according to Sattler, in 30 per cent of the cases; it may be associated with flatulence and loss of appetite. The most common metabolic disturbance is the *emaciation*, which is doubtless due to the remarkable increase in the body catabolism, which is a striking characteristic of the disease; according to A. Kocher, it is present in 88 per cent of the cases. Recently it has been found that hyperfunction of the thyroid gland results in an inhibition of the pancreatic function and indirectly causes the indigestion. A contrary action exists, so that overstimulation of the pancreas will result in a marked diminution in the activity of the thyroid gland.

Finally, as Satterthwaite(1) remarks, "There is a theory now prevailing that the thyroid is a central station for iodine metabolism. Under this conception, one of the tasks of the gland is to remove from the blood such iodine as is desired from the food, while another task is to manufacture an iodine compound, the normal thyroidin, which is liberated by it for use in the system. If this thyroidin is thrown off in too large quantities, it may settle on the nervous, circulatory and generative systems and overwhelm them, producing the thyroidism of Graves' Disease."

The most recent views concerning the nature of exophthalmic goiter are those advanced by Du Bois(2) in his last work, and by Henry S. Plummer, of the Mayo Clinic, expressed in a personal communication(3). Plummer remarks: "The syndrome in exophthalmic goiter is, in the main, undoubtedly due directly to excessive catabolism. Dr. Kendall(4) in this clinic has recently brought out evidence almost definitely establishing the fact that the thyroid hormone is the active agent concerned in the breaking down of amino-acids, the essential constituents of proteins. The syndrome of exophthalmic goiter is, then, to a large extent, an excessive catabolism of proteins. This at once suggests the advisability of a diet

low in protein foods. Such a diet should be followed; it has long been advised in exophthalmic goiter and within certain limits is probably correct. Unquestionably the diet should be one that will reduce catabolism to the lowest point. This indication is best met by a diet low in proteins and rather high in fats relative to the carbohydrates."

Du Bois states, "To those who are accustomed to think in terms of the energy requirement, exophthalmic goiter stands out *par excellence* as the disease of increased metabolism, and the increased metabolism stands out as the chief symptom of hyperthyroidism. The determination of the heat production seems to afford the best index of the severity and course of the disease." The studies of Du Bois indicate clearly that patients with exophthalmic goiter require large quantities of food. In general, this author finds that they need from one and a half times to twice as much food as a normal person under similar circumstances. The determining elements must be the severity of the case and the degree of muscular activity. The conclusion is that unless food of high caloric value is given in large amount, losses of body fat and protein will occur.

Dietetic Suggestions.—With this brief résumé of the essential nature of the disease and its evident bearing upon the proper diet to select in such cases, the following suggestions should be valuable in the dietetic management of exophthalmic goiter.

Mild cases of the disease unaccompanied by gastro-intestinal symptoms do not require much alteration in the diet.

Advanced cases marked by cardiac palpitation, tremor and great emaciation will require careful dieting. As Thompson(5) has noted, the indications for treatment now are the building up of the body strength, the supplying of the body waste, the avoidance of substances which will disturb the gastro-intestinal tract by inducing flatulency and constipation, and the elimination of substances which will irritate the nervous system and increase cardiac palpitation. Thompson is not in accord with the view that all protein foods should be withheld. He believes that while it would be unwise to order an exclusive protein diet, the anemia, which is often a prominent symptom, should be combatted by a mixed dietary of animal and vegetable food, care being observed to prevent the development of dyspeptic manifestations.

Falta and Meyers(6) have found that the administration of albumin increases the secretion of the thyroid gland and therefore aggravates the disease. They believe that the administration of a diet containing an abundance of nitrogen-free energy carriers will favorably influence the body weight and also exert a mitigating influence on the hypersecretion

of the thyroid gland. They also observe that such a diet is least disturbing to the gastro-intestinal tract. They do not agree with Karl von Noorden's view that superalimentation is indicated in this disease, a quart of liquid food being given at a time, following a careful gastric lavage. The danger of such a course of overfeeding is that the increase in the body weight will overbalance the improvement in the cardiac activity and thereby induce a sudden cardiac collapse.

DIETETIC TREATMENT OF ACUTE CASES.—Watson(7) claims that acute cases of exophthalmic goiter are best treated by an almost exclusive milk diet for varying periods of time. Two or three pints of milk—which may or may not be skimmed and peptonized—and one pint of strong beef tea may be used daily. It is important that the hygiene of the mouth be carefully attended to, and if any solid food is taken, mastication must be thorough. Generally it will be found that these patients have been ingesting an excess of starchy foods and tea, and occasionally an excess of rich meat foods. A close study of the nature of the stools will aid materially in the selection of the proper diet. If the passages are fetid and illy formed, the intestinal tract is abnormally septic; and if scybalous masses are discharged, a degree of constipation is present, both of which are deleterious. If diarrhea is present, the milk should contain a proportion of lime water and should also be peptonized. In all cases, rest in bed is an important adjunct to the treatment, as rest of the body lessens nervous excitability.

If food other than milk is allowed, it should be plainly cooked and should consist of meats in moderation, milk, fats (such as cream, butter and cod-liver oil), carefully prepared cereals, fresh fruits and green vegetables. Such a diet agrees with the suggestion of Rudinger, who found that an almost albumin-free diet, very rich, however, in carbohydrates, would depress the increased metabolism of the normal individual.

DIETETIC TREATMENT OF SUBACUTE AND CHRONIC CASES.—In subacute and chronic cases, in which the symptoms are not urgent, all that is necessary is a careful regulation of the diet. Tibbles(8) has well defined this phase of the treatment when he observes that "oatmeal and liver strongly stimulate, animal foods in general moderately stimulate, and a diet of milk, eggs, bread-and-butter, biscuits, and the like, only slightly stimulate the thyroid gland." This observation serves as an excellent guide to the proper diet in these ordinary cases of exophthalmic goiter. "Oatmeal, liver and excess of animal foods must be avoided; butcher's meat, oysters and lobster should be forbidden. But the food must be good, light and nourishing. Once a day the patient may have a moderate help-

ing of fish or fowl (domestic fowl, pheasant, partridge, quail, pigeon), with potatoes, vegetables and fresh fruit. Eggs, milk, milk puddings, custard, junket, jelly, bread-and-butter, and bacon or fat ham will complete the dietary. Fresh fruit and salads are advantageous; the amount should be regulated by their action on the bowels." The drinking of buttermilk should be encouraged, since the lactic acid ferments exert a markedly beneficial effect upon the progress of the disease by causing a decided lessening of the tachycardia and other nervous symptoms. Fresh home-made buttermilk is preferable, although the chemically prepared products may be used.

Watson gives the following as an appropriate sample menu for exophthalmic goiter patients:

WATSON'S MENU FOR EXOPHTHALMIC GOITER

Breakfast—8 A.M.

Cup of tea; bread and butter. (Sugar and jam or marmalade should be taken very sparingly.)

Lunch—11 A.M.

Glass of milk or buttermilk.

Dinner—1 P.M.

Bowl of soup made from good vegetable stock; or piece of fish or chicken; bread and cheese; celery, or a little fruit. (On days when no soup is taken, a glass of milk or buttermilk may be recommended.)

Tea—4 P.M.

Cup of tea; thin slice of bread and butter.

Supper—7 P.M.

Either: soup, meat, pudding; or meat, pudding, savory. With regard to this meal the following points should be noted:

Soups should occasionally be vegetable and occasionally of animal stock.

The meat course should frequently consist of fish, chicken, rabbit, tripe, or sweetbread in place of the heavier red meats.

Care must be taken with the use of root vegetables; occasionally they are better withheld.

Suet puddings and pastry are not advisable. Curds, custards, milk-pudding, or stewed fruit are the most suitable puddings.

Tea, coffee, alcohol, condiments and tobacco, because of their effect upon the sympathetic nervous system, and their tendency to induce tachycardia, tremors and other nervous phenomena, should be absolutely forbidden or taken only in the smallest amount. If any alcohol is taken—as in the case of habitués, in whom the sudden withdrawal might induce marked cardiac weakness—it should be in the form of a red wine in very small amounts. Sugar, sweets, ices, pastry and all excessively starchy

foods must be avoided, because of the danger of inducing abnormal gastrointestinal fermentation. Fried foods, nuts, pickles and "made dishes" are also apt to cause gastric and hepatic indigestion and must be avoided. Meat foods must be restricted in order to lessen the possibility of intestinal putrefactive changes, as well as to diminish the strain thrown upon the thyroid gland.

In the presence of indigestion—gastric, hepatic or intestinal—it is best to limit the diet mainly to milk and farinaceous foods, especially tapioca, rice, sago and arrowroot, which are readily digestible and do not stimulate the activity of the thyroid gland. Tibbles insists that such a diet must be continued until the gland regains its ability to metabolize the iodine. As the patient improves, chicken, fish and poached eggs should gradually be given.

SPECIAL FORMS OF DIETETIC TREATMENT OF EXOPHTHALMIC GOITER.—1. *Lactovegetarian diet.*—In certain cases a lactovegetarian diet with a total exclusion of meat may be valuable. Such a diet should consist of milk, bread and butter, puddings, fresh vegetables, uncooked fruits and a few nuts. The food should be nourishing and contain plenty of fat.

2. *Thymus Feeding.*—Tibbles calls attention to the fact that the use of the thymus gland has been established as a "cure" for hyperthyroidism. This idea resulted from the interesting observation that exophthalmic goiter does not occur, or is exceedingly rare, as long as the thymic action is preserved, as in children, while the common occurrence of goiter in young adults after there has been a complete atrophy of the thymus would seem to indicate that the disease results, in part at least, from removal of the thymic inhibitory influence. The administration of one-fourth ounce daily for from three to four months, has resulted in an amelioration of the tachycardia and has perceptibly lessened the exophthalmos, but has had no effect upon the muscular tremors nor upon the size of the goiter.

3. *The Use of Milk in Thyroidectomized Animals.*—Moebius, in 1907, first suggested the method of feeding patients with exophthalmic goiter on the milk of goats whose thyroids had been removed. The basal theory was that these animals would probably develop in their systems certain antibodies neutralizing the characteristic toxins of the disease. Boyd(9) and others claim, however, that the results have not been satisfactory, the slight improvement which followed in all probability being due to the rest and better hygiene which is insisted upon.

The practical outcome of the method is the use of food which does not contain the thyroid secretion—as fish of all kinds, fat bacon, chicken, eggs, fresh fruit, cream, butter, bread and carbohydrates generally. Goe-

bel says that the milk of thyroidectomized animals does not contain iodine, since the organ which excretes this substance has been removed. Therefore, he concludes, other foods containing a recognizable amount of iodine may advantageously be eliminated from the diet, while those containing arsenic, as eggs, may be employed, as may also mineral waters containing sodium phosphate, arsenic and iron. In this connection the following table given by Tibbles will prove valuable(10):

IODINE IN PLANTS

(Milligrams per Kilo)

Potatoes, carrots, endive, parsley	Nil.
Cucumber	0.012
Kidney beans	0.013
Pumpkin	0.017
Spinach	0.021
Sorrel	0.047
Melon	0.060
Tomatoes	0.070
Green peas	0.084
Lettuce	0.096
Beans	0.140
Chervil	0.140
Beetroot	0.140
Radish	0.160
Turnip	0.240
French beans	0.320

IODINE IN FISH

Gudgeon	0.1
Ray and skate	0.2
Mackerel, whiting and pike	0.3
Sardines, herring, carp and mullet	0.6
Shrimps	0.7
Periwinkle	0.75
Sole, eel and herring roe	0.8
Coal-fish	0.9
Cod, roach, bream, ling and gurnard	1.2
Oysters	1.3
Salmon	1.4

SUITABLE DIET LIST IN EXOPHTHALMIC GOITER

May Take:

Milk (whole or skimmed, with or without lime water), cream, buttermilk, curds, junket, cheese, custard, milk-puddings.

Cod-liver oil.

Fish.

Meats (in moderation), meat-extracts, beef-juice, beef-meal or powder, fat bacon, fat ham, tripe, rabbit, sweetbread, throat sweetbread (thymus).

Fowl (chicken, pheasant, partridge, quail, pigeon); eggs, eggnog.

Soups (leguminous purées alternating with animal broths).

Green vegetables, celery, potatoes (in moderation).

Cereals (carefully prepared and partially predigested by malt extract): tapioca, sago, rice, arrowroot.

Bread, biscuits, carbohydrates generally.

Fresh fruit, stewed fruit, jelly (slight amount).

Mineral waters containing sodium phosphate, iron and arsenic.

Must Avoid:

Stimulants of all kinds—tea, coffee, condiments, ice water, soda water, alcohol, tobacco.

Fried food, "made dishes."

Oatmeal, germ bread, entire wheat bread.

Liver, oysters, lobster, suet pudding.

Asparagus, spinach, peas, beans, lentils, pickles.

Sugars, sweets, confectionery, ices, cakes, pastry.

Bananas, watermelon, berries, nuts.

HODGKINS' DISEASE

Nature of Hodgkins' Disease.—The etiology and precise nature of Hodgkins' disease (lymphadenoma, pseudoleukemia) are as yet unknown. It is characterized clinically by a progressive enlargement of the spleen and lymph-glands of the body, together with the formation of lymphoid growths in the liver, spleen, lungs and other organs, but without being associated with the characteristic blood-changes of leukemia or pernicious anemia. The disease is by far most common in boys and young men, at least 75 per cent of the cases occurring between the ages of ten and forty years. The course is generally rapidly progressive to a fatal termination. The condition has been regarded by many as a type of glandular tuberculosis. The abdominal lymph-glands may share in the process, and the lymphatic tissue of the bowel may be involved, in which case symptoms of a similar nature to those characteristic of the leukemias may be present. As a rule, however, gastro-intestinal symptoms are less frequent in Hodgkins' disease than in pernicious anemia.

DIET IN HODGKINS' DISEASE.—The dietetic treatment of this disease must be conducted along ordinary lines. Arsenic, quinin, iron, phosphorus, strychnin, cod-liver oil, and other hematopoietic drugs must be administered in as large doses as may be taken safely by the patient. Recently, the use of the Roentgen rays has induced favorable results in cer-

tain cases. The most nutritive food should be provided in the most readily digestible form in order to guard against disturbances of the stomach and intestines. In the absence of symptoms associated with the alimentary tract, a generous diet is indicated. It is well to have the patient eat small quantities of food at frequent intervals. A diet with a large food residue should not be taken. As Sutherland (11) has indicated, milk should form the main staple and it should be given in as large quantities as can be tolerated; if necessary, it should be predigested or diluted with lime water. Occasionally the meat extracts or raw meat juices will be well borne. If severe gastro-intestinal symptoms should develop, all solid food should be stopped and liquids in small amounts administered. In the presence of fair gastric digestion, the diet should consist of proteins rather than of the farinaceous foods.

DIET LIST IN HODGKINS' DISEASE

(Altered from Ortnier) (12).

Milk: (in large amounts, at times predigested); kefir; custards.

Meats: (in moderation); rare roast beef; shaved raw ham or beef; tender white meat (boiled calves' brains, sweetbread); fowl; squabs; eggs; artificial meat preparations; bouillon; beef tea.

Game: venison; quail.

Fish: trout; pike; whiting; sole; oysters; caviar; cod-liver oil.

Vegetables: spinach; carrots; asparagus; artichokes; green peas; mashed potatoes.

Breadstuffs: wheat bread; rolls; dried bread; toast; zwieback; crackers.

Fruits: jellies; apple sauce; pear compôte; orange compôte; stewed plums.

Beverages: cocoa; chocolate; good wine; beer.

Fats: butter is generally the only fat permissible.

MYXEDEMA AND CRETINISM

The condition of myxedema and cretinism (hypothyroidism), anatomically and pathologically, is the reverse of exophthalmic goiter. In place of being overactive, as in the latter condition, the thyroid gland is atrophied or depressed in its physiologic function. The excessive metabolism of hyperthyroidism is replaced by lessened body metabolism.

If this thyroid defect is congenital or develops within the early months of postnatal existence, the condition is known as *cretinism*. Occurring after the advent of puberty, it is known as *myxedema*; and if consequent upon resection or ablation of the thyroid gland, it is termed *myxedema strumipriva*. Whenever occurring, the disease is characterized clinically by an arrest of both mental and physical development and frequently by a steadily progressive obesity indicative of the imperfect metabolic proc-

esses of the body. If the symptoms of the disease are obscure or masked, as in the cases first described by Hertoghe, the condition is termed *myxedema fruste*. Myxedema is more common in women than in men, in the proportion of six to one.

Pathogenesis of Myxedema.—The characteristic lesion of the disease is an atrophy of the thyroid gland which is dependent upon the development of fibrous tissue in the organ with a proportionate reduction in the amount of the glandular elements. Consequently, there is a subnormal production of thyroïdin, which results in a diminution in the activity of the nervous system and a lessening in the amount of the body metabolism with necessarily a fall in the body temperature. The lowered temperature may also, in part, be due to a disturbance in the nervous mechanism which regulates the temperature of the body. Sajous(13) remarks that all the tissues of the body, in the presence of myxedema, are inadequately supplied with oxygen, because of an insufficient quantity of thyroidase and adrenoxidase in the system, both of which substances are necessary for physiologic metabolism. Hence, he claims, arises the hypothermia and the sensation of cold of which the patients complain. In cretinism the deficiency in the amount of these two substances entails a lack of trypsin and nucleoprotein; wherefore, because of the absence or deficiency of the three main elements in the vital process, occurs the lack of development of the body and brain.

Dietetic Suggestions in Myxedema and Cretinism.—This brief résumé of the pathogenesis and pathology of these conditions will suggest the proper treatment to be pursued from a dietetic standpoint. It is self-evident that the physical condition of the patient must be improved by supplying the missing glandular secretions. Hence has arisen the specific *thyroid-therapy* which has wrought such a remarkable change in the clinical management of hypothyroidism in its various forms. Benedict(14) has concisely stated the present therapeutic status of this condition when he remarks: "Great benefit has been obtained in many cases of cretinism, practically a cure in many of myxedema, relief or cure in some of obesity and general disturbances of nutrition in old age, from the use of thyroid extract, iodothylin, or fresh glands, and apparently the use of these remedies is as efficient by ingestion as by injection."

The thyroid treatment is rapidly beneficial in all the forms of cretinism and myxedema, with the exception of the Mongolian type of idiocy, in which it seems to fail. In the case of Hertoghe's "masked myxedema," the drug is of great value, especially when given in small doses more or less continuously throughout life. The obesity lessens and

there occurs a remarkable restoration of mental and physical vigor. In all cases in which thyroid-therapy is employed, care must be taken to avoid inducing a condition of hyperthyroidism. No physical exertion should be allowed while the patient is undergoing the thyroid treatment. In cretinism the more favorable results are obtained in the younger patients.

DOSE AND METHOD OF ADMINISTRATION IN THYROID-THERAPY.—Large doses of the thyroid extract or of the powdered glands of the sheep or calf should not be used. For an adult, three grains of the gland three times daily is a suitable dose. Children may be given one grain three times in the day. If the heart and pulse become weak and irregular, the treatment must be temporarily stopped. Raw thyroid gland may be administered in the quantity of one-eighth to one-quarter of a lobe once or twice a week(15), or the gland may be moderately cooked. Musser and Kelly(16) state that some patients will take sandwiches made of finely chopped thyroid gland without difficulty, but in most cases the tablets or capsules will be preferred. Grafting of the thyroid gland is now used successfully in order to obviate the necessity of constantly administering the drug.

GENERAL DIET IN CRETINISM AND MYXEDEMA.—Cretinism and myxedema require no special dietetic instruction. Grulee(17) states: "A cretin who has gone some time without treatment will often show a severe degree of malnutrition which will respond to thyroid treatment and will gain weight rapidly without any change in diet whatever." As a general rule, the diet should consist of plain, simple and nutritive food selected largely according to the peculiarities of the patient's metabolism. Meat in excess should be avoided, and the patient should live mainly on milk, eggs, butter, cereals, vegetables and a salt-free diet. It has been found that meat in certain instances will induce tetanic attacks. Rest and quiet should be insisted upon, and the patient should be kept warm.

An interesting suggestion by Benedict is to the effect that certain investigations have shown that the content of the thyroid in iodine is inverse to the distance from the ocean. It is possible, therefore, that sea-foods, especially of a vegetable nature, may be of service in the dietetic treatment of hypothyroidism.

OSTEOMALACIA

Trousseau declares that osteomalacia should be termed the "rickets of adults." As Mauclaire(18) has indicated, from a histologic point of view it is a lesion of nutrition characterized by an absorption of the calcareous

salts of the bony tissues and a dissolution of the osseous network; consequently, the Haversian canals as well as the central cavity of the individual bones are markedly dilated and filled with a reddish marrow. There is present an inflammation, as well as a degeneration, of both the red and yellow marrow. The muscles of the body also, probably because of non-use, show a decided fatty degeneration.

Pathogenesis of Osteomalacia in its Relation to Dietetics.—The most accurate method of arriving at satisfactory deductions as to the proper diet for any disease is to ascertain its pathogenesis. Unfortunately, the pathogenesis of osteomalacia is obscure, and many theories have been suggested in the effort to solve the problem. Thus, Volkmann, Ribbert and Lane regard the disease as merely a demineralization of the bones, a view which is rejected by Kassowitz. Stansky and Proisseau classify it as a special variety of osteitis. Bouchard believes it is a dyscrasia quite distinct from rachitis, characterized by an accumulation of lactic acid in the bony tissues (Weber), which causes a solution of the calcium phosphate. Haller and Navier favor the theory of hemic acidity, and Renard claims that this acidity is due to the presence of phosphoric acid. The parasitic theory is supported by Zuern and Basset, who report that they have discovered the microörganism in the bones. Comby regards osteomalacia as a disease of malnutrition resulting from gastric dilatation. Finally, Fehlin believes it is a trophoneurosis of the bony system, dependent upon a similar affection of the ovaries, which on account of the important rôle played by bone-marrow in the composition of the blood, causes an alteration in this substance. The ovarian disease results, he believes, in an overactivity of these organs, and as they appear to be the point of origin of the reflexes which stimulate the vasodilators of the blood vessels of the bones, a passive hyperemia of the bony system follows, with a subsequent active absorption of the osseous elements. Castration, by removing the starting point of these reflexes and thereby depressing the vasodilators, results in a contraction of the bone blood vessels, and finally with an ultimate cure of the disease.

Unfortunately, this theory is contra-indicated by certain established facts, as the occasional development of osteomalacia in the male (although the disease occurs about nine times as often in women as in men), the occurrence of cures after the performance of simple Cesarean section (Winckel, Gueniot, Freund), and the undoubted cure of cases by medical treatment alone (Tronsseau, Busche). In support of the theory, however, it must be admitted that there is undoubtedly a retention of calcium in the organism after the menopause, and as osteomalacia has been cured by

artificially inducing the menopause by oöphorectomy, it must be concluded that the ovaries do in some way influence calcium metabolism.

Recently, valuable suggestions have been made to the effect that osteomalacia is due to insufficiency of the parathyroids, and again, that it results from some pathologic condition of the suprarenal bodies. It has been proven that the adrenals are concerned in some way in the retention of calcium in the body, and also that the thyroid gland and the adrenals mutually stimulate each other; therefore, thyroid insufficiency must imply a loss of the normal stimulation of the adrenals. Hoenicke first called attention to the great frequency of lesions of the thyroid gland in osteomalacia, and ascribed to this gland a prominent place in the pathogenesis of the bone disease. He believes that the latter results from nutritive changes which particularly influence the metabolism of calcium. The parathyroids share in this influence upon the nutrition of bone tissues, as has been proved by the experiments of Leopold and Reuss, who observed an arrest of bony development in a young rat following parathyroidectomy. Morel also has notably retarded the consolidation of certain fractures by removing the parathyroids. The hypophysis has likewise been found to exercise a certain influence upon the metabolism of calcium and phosphorus.

The evident deduction from these observations is that the glands of internal secretion, and especially the suprarenal capsules, act in some way on the decalcification of bony tissue. Falta and Meyers(19) conclude that a number of important facts point to the involvement of the ductless glandular system in the development of osteomalacia. These are the almost exclusive occurrence of the disease in pregnant women; the curative action of castration upon the disease, and its improvement after labor or premature termination of the gestation; the association of the disease with disorders of other ductless glands, as exophthalmic goiter, tetany and myxedema; the great frequency of hyperplasia of the parathyroids in osteomalacia (Erdheim, Strada); the lessened glycosuria action of adrenalin when administered in the course of osteomalacia; and the improvement which follows the use of adrenalin, pituitrin and other extracts of the ductless glands.

Dietetic Management of Osteomalacia.—These suggestions as to the probable pathogenesis of osteomalacia must be our guide to the proper diet for the disease. If the theory of parathyroid insufficiency be accepted, the treatment must be very similar to that of rachitis and cretinism. It is undoubtedly true that improvement follows in some cases in which phosphorus and phosphorus-carrying foods are administered,

this drug having, as Lorand(20) emphasizes, a favorable effect upon the metabolism of calcium. It must not be forgotten that it is the thyroid gland which regulates the metabolism of phosphorus, and if this organ is overactive, the mere administration of phosphorus will not answer. The thyroid must then be treated, and the neglecting of this precaution may be the explanation of the failure of improvement in certain instances following the use of phosphorus.

Lorand also makes the following valuable suggestion: "That food which contains the greatest amount of phosphorus is also the one which is rich in nucleins—uric acid producers. Animal foods are not only rich in these substances, but more organic phosphorus is also absorbed from them than from a vegetable diet, since in the latter the phosphorus, owing to the large lime content, is eliminated in an insoluble form from the intestine." On the strength of this hypothesis Busche recommends the use of three milligrams of phosphorus daily in cod-liver oil; Bouchard employs a diet largely of animal foods combined with good hygiene and life in the open air; Pelezar advises frequent sea-bathing; Benedict(21) remarks that there is a general indication for good feeding and hygiene, and a special indication for lime salts and phosphorus, and Friedenwald and Ruhräh(22) state that as nutritious and as generous a diet as the patient can digest should be given, together with an abundance of salts. Phosphates and hypophosphites with cod-liver oil are probably the best means of supplying salts to the system. Gilman Thompson(23) remarks that "it is customary to arrange the diet with regard to furnishing an abundance of salts in fresh green vegetables, together with such foods as eggs and meal. It is advisable also to prescribe cod-liver oil, either alone or in combination with various phosphates or hypophosphites." Such food proves, on the whole, the most serviceable in the dietetic treatment of the disease.

Tibbles(24) believes that the diet should consist largely of milk and oatmeal. An abundance of fresh meat, fowl, fish, soup and meat extract should also be given to nourish the body and to favor stimulation of the thyroid gland, and, through it, of the adrenals. Care should be taken at the same time to avoid inducing gastro-intestinal catarrh, bacterial fermentation or disturbances of the liver and other organs. Knowles(25), from her experience in treating osteomalacia in India, would restrict the use of meats and eggs, but recommends large quantities of fish, at the same time administering sirup of the iodid of iron.

ORGANOTHERAPY IN OSTEOMALACIA.—The consideration of the dietetic management of this disease would be incomplete without a brief reference

to the use of animal extracts as curative agents. Bossi, in 1907, originated his method of subcutaneous injections of adrenalin in the treatment of osteomalacia. Strange to say, Stoltzner some time previous to this (in 1899) had claimed cures in the treatment of rickets by suprarenal opotherapy. Bossi was prompted to his procedure by noting that osteomalacia is most marked after ablation of the suprarenal capsules. It is now known that the administration of adrenalin, or suprarenal extract, does cause a retention of calcium in the body. Other extracts of the ductless glands have been similarly employed. Thus, Bab, in 1911, first used pituitrin, the extract of the hypophysis, for this purpose. The investigations of Borchardt, Weiss, Krause and Kepinow have shown that pituitrin, stimulates the action of the suprarenal glands, and successful cases of hypophysis therapy of osteomalacia have been recorded by Neu, Bondi, Pal and Stocker. Knowles has employed pituitrin, thyroid and thymus extracts, adrenalin and ovarian extract in the form of tablets and hypodermically. The only one giving satisfactory results in any degree was pituitrin administered in two-grain doses twice daily for months. The dose of adrenalin by injection is one milligram repeated every two days, from twenty to thirty injections, or more, being required to obtain results. According to Cristofolletti, the best results follow in the cases occurring in pregnant women. In 1907, the Roentgen rays were first used by Seligmann in the treatment of osteomalacia, but the results to date have not been satisfactory.

DIET LIST IN OSTEOMALACIA

May have:

Milk, cream, butter, buttermilk.

Cod-liver oil.

Meats in abundance; meat extracts; fat ham; fat bacon; powdered bone; soups.

Fowl of all kinds; eggs.

Fresh green vegetables.

Fish of all kinds in abundance.

Salts in abundance (calcium phosphate; other lime salts; phosphorus, phosphates, hypophosphites).

Avoid:

A preponderance of carbohydrates.

DIET IN OSTEOMALACIA.—From the foregoing remarks the following may be accepted as the proper course of treatment for osteomalacia: The selection of a diet rich in phosphorus and lime salts; the use of adrenalin hypodermically to stimulate the internal secretions of the body and there-

by favor the retention of calcium in the tissues; and the administration of phosphate of calcium in full doses. This course of treatment failing, resource should be had to ovarian castration in female subjects.

SYPHILIS

Nature of Syphilis.—In the middle ages, when all diseases were supposed to result from alterations or affections of the humors or fluids of the body, and all food substances were supposed to exert some influence upon the body fluids, the dietetic treatment of syphilis was an important matter. As Fournier(26) has shown, diet lists were published at that time prohibiting meats and almost all the essential articles of food, so that it was a matter of great difficulty to select a suitable and nutritious dietary for syphilitics.

It is now well recognized that syphilis is a debilitating disease and that the general nutrition of the patient should receive the closest attention throughout the prolonged course of treatment that will be necessary. All physicians agree that there are no aliments which are particularly favorable or unfavorable for syphilitics to use. Fournier summarizes the simple dietetic rules for syphilis as follows:

1. If the usual diet of the patient is good, it requires no change.
2. If it is insufficient or defective, it requires suitable modification.
3. If it is excessive, it requires reducing to an hygienic level.

General Dietetic Rules for Syphilis.—Some general suggestions concerning the proper diet for syphilitics may be laid down as follows:

The diet should consist of an abundance of plain, nutritious, easily digestible and non-stimulating food. Soups, fruits and green vegetables, however, should be taken in but moderate quantities.

All dietetic errors and irregularities should be corrected, such as the ingestion of an excess of food and of alcoholic stimulants. This precaution must especially be observed if there is any danger of the rupture of blood vessels, particularly in the central nervous system.

"Made dishes," fancy dishes, desserts, pastry and confectionery should be used sparingly.

If there are mucous patches or other local lesions in the mouth or throat, a cleansing wash and gargle of some antiseptic, even a weak bichlorid solution, should be used before eating.

In greatly debilitated patients, the best results from the medicinal

treatment may be delayed until forced feeding is instituted. The administration of mercury for a long time will have the effect of producing anemia and pallor; the drug should then be temporarily stopped, and iron, strychnin, arsenic and other tonics and blood-making foods administered.

Cod-liver oil should be a prominent article in the diet, especially in the presence of marked emaciation and loss of weight, or when tuberculosis complicates the disease.

Tea and coffee, as well as alcoholic stimulants, are contra-indicated, because of the tendency to lesions of the blood vessels and viscera. In cases of asthenic syphilis, coffee may be allowed in small amounts as a stimulant.

Fournier(27) states that during the course of mercurial treatment all foods and drinks that may cause diarrhea, such as an excess of fruit, iced drinks, and large quantities of laxative foods, should be forbidden. The patients' idiosyncrasies in this respect should also be noted.

There is a diversity of opinion as to propriety of giving acid drinks and fruits during a course of mercurial treatment. In all probability, oranges, lemons, rhubarb and acid berries should be prohibited, in order to avoid any chemical reaction with the mercury contained in the tissues of the body.

The administration of vegetable extracts having supposed virtues as alteratives should not be encouraged.

In certain acute cases running a malignant or semi-malignant course, a diet suitable for mild fever will be most appropriate.

The most scrupulous care should be observed to avoid infection of others from table utensils.

THE USE OF TOBACCO AND ALCOHOL BY SYPHILITICS.—On account of the tendency to leucoplakia and other local lesions in the mouth and throat, as mucous patches and chronic ulceration, the use of tobacco—and particularly cigarette-smoking—should be forbidden because of its irritating effect.

Keyes(28) remarks that "alcohol is the commonest as well as the most active enemy of the syphilitic. Malignant early syphilis is most frequent among those who have been alcoholic, malignant late syphilis among those who remain alcoholic. Persistent drinking may make it impossible to prevent or to cure tertiary relapses."

If any alcohol is permitted, it should be taken in the strictest moderation and preferably in the form of beer, claret, hock or the light Rhenish wines, and these are best taken with the meals. The habitual use of whiskey and other spirituous drinks is distinctly injurious. Alcohol is espe-

cially harmful in the presence of the dermatoses and syphilitic lesions of the nervous system.

SPECIAL DIETETIC INDICATIONS.—1. *Diet During Inunction-therapy.*—The diet under these circumstances should be very generous; the same necessity for curtailment does not exist as when the mercury is taken by the mouth. The free drinking of new milk should be encouraged, and plenty of rich meat and nutritious vegetables and fruits may be employed.

2. *Diet in the Presence of Mercurial Stomatitis.*—When this complication exists, the diet should be liquid or pultaceous, and should consist mainly of milk, eggs and cereals, together with expressed meat and fruit juices, according to Benedict(29). Thorough cleansing and disinfecting of the mouth and throat lesions should be insisted upon, hydrogen peroxid or even strong antiseptics being used for this purpose. Benedict emphasizes the fact that occasionally, in these cases, gavage may be less painful for the patient and may lessen the danger of gastric infection.

3. *Diet in Syphilitic Cirrhosis of the Liver.*—The diet in these cases should be practically the same as in any form of hepatic disease. Overeating should be avoided in order to prevent an excessive demand upon the liver and to lessen the danger of gastro-intestinal putrefaction. No alcohol should be allowed, and all irritating articles of food, as spices, peppers, mustard, concentrated meat extracts and meat broths, radishes, horseradish, onions, watercress and celery, must be prohibited(30). Salt in excess and coffee are also vicious in their effects. Weak tea, however, may be beneficial. If the case is advanced, with dropsy and an overtaxed heart, the diet should consist mainly of milk (which may be diluted with lime water or peptonized), albumin water, gruels, kumiss, buttermilk and bland broths, or oyster soup.

4. *Diet in Grave Lesions of the Nervous System.*—In the presence of gummata of the brain or other viscera or marked endarteritis of the vessels of the nervous system, the patient should be placed upon large doses of potassium iodid and the diet should be restricted to milk, eggs and broths. Rest in bed should be enforced. If bulbar symptoms develop, the greatest care must be observed in feeding the patient. The food should be soft and moist, and all food requiring mastication should be finely minced in order to prevent choking. If fluids are given, they should be administered by a spoon in preference to the feeding cup. If taken in too large amounts, some fluid may escape into the respiratory tract and cause inhalation-pneumonia or death from strangulation. The same precautions must be observed when patients are semi-conscious or somno-

lent from gummatous tumors of the brain. It may become imperative in these cases to resort to rectal feeding.

5. *Diet in Infantile Syphilis*.—It is often extremely difficult to nourish an infant suffering from congenital syphilis. It is most important that these babes should be nourished by breast milk, and if this can be accomplished, and the proper treatment by mercurials internally and by inunction be carried out, they will generally do well. "Deprivation of its mother's milk is a much more serious matter for a syphilitic than for a non-syphilitic child."

REFERENCES

1. SATTERTHWAITE. Some of the Modern Problems in Graves' Disease, New Orleans Med. & Surg. J., April, 1915, vol. lxxvii, No. 10, p. 823.
2. DU BOIS, E. F. Clinical Calorimetry, 14th Paper, Metabolism in Exophthalmic Goiter, Arch. Int. Med., June, 1916.
3. PLUMMER, HENRY S. Private communication, July 21, 1916.
4. KENDALL, A. I. Bacteriology, General, Pathological, Intestinal.
5. THOMPSON, W. GILMAN. Practical Dietetics, 1909.
6. FALTA and MEYERS. The Ductless Glandular Diseases, 1915.
7. WATSON. Food and Feeding in Health and Disease.
8. TIBBLES, WILLIAM. Food and Health in Disease.
9. BOYD. On the Treatment of Exophthalmic Goiter, Especially in Relation to the Control of Protein Metabolism, Edinburgh Med. J., August, 1915, vol. xv, p. 108.
10. TIBBLES, WILLIAM. Food and Health in Disease.
11. SUTHERLAND. A System of Diet and Dietetics, 1906, p. 644.
12. ORTNER, N., and POTTER, N. B. Treatment of Internal Diseases, 2nd ed., 1913, p. 169.
13. SAJOUS, C. E. The Internal Secretions, 1911, vol. i, p. 191.
14. BENEDICT, A. L. Golden Rules of Dietetics, 1908, p. 251.
15. FRENCH, J. M. Textbook of the Practice of Medicine, 4th ed., 1910, p. 564.
16. MUSSEY and KELLY. A Handbook of Practical Treatment, 1911, vol. i, p. 850.

17. GRULEE, C. G. Infant Feeding, 1914, p. 293.
18. MAUCLAIRE, P. Maladies des os, 1908, p. 217.
19. FALTA and MEYERS. The Ductless Glandular Diseases, 1915, p. 435.
20. LORAND, ARNOLD. Health and Longevity, 1912, p. 374.
21. BENEDICT. Golden Rules of Dietetics, 1908, p. 334.
22. FRIEDENWALD and RUHRÄH. Diet in Health and Diseases, 1913, p. 645.
23. THOMPSON, GILMAN. Practical Dietetics, 1909, p. 768.
24. TIBBLES, WILLIAM. Food in Health and Disease, 1914, p. 488.
25. KNOWLES, K. Osteomalacia in India, Brit. Med. J., 1914, vol. ii, suppl. 62.
26. FOURNIER. The Treatment and Prophylaxis of Syphilis, 1907, p. 292.
27. ————. The Treatment and Prophylaxis of Syphilis, 1913, p. 573.
28. KEYES, EDWARD L. Syphilis, 1908, p. 129.
29. BENEDICT, A. L. Golden Rules of Dietetics, 1908, p. 346.
30. FRIEDENWALD and RUHRÄH. Diet in Health and Diseases, 1913, p. 503.

CHAPTER XV

DIET IN DISEASES CAUSED BY ANIMAL PARASITES

Protozoa.

Cestodes: *Tenia Solium*; *Tenia Saginata*; *Tenia Nana*.

Trematodes: *Fasciola Hepatica*; *Paragonimiasis*; *Conorchis Sinensis*; *Bilharziasis*.

Nematodes: *Ankylostomiasis*; *Ascariasis*; *Oxyuris Vermicularis*; *Filaria Medinensis*; *Trichocephaliasis*; *Trichinosis*; *Filaria Sanguinis Hominis*.

The body of man serves as a host for a great variety of animal parasites, protozoa, cestodes, trematodes, nematodes and a large number of arthropods, as well as insects—all including members which are parasites of man. All those animal organisms which never rise above the unicellular stage are termed protozoa. The development of our knowledge of the ameba of man is of interest, but the available information is far from complete.

PROTOZOA

Protozoa are unicellular animals, solitary or united into colonies, free living or parasitic, with a sexual reproduction (schizogony) by binary fission, budding or fragmentation and sexual reproduction (sporogony), or merely rejuvenescence by conjugation.

The origin of the protozoan blood parasites of man is twofold, (*a*) from man's intestine into the blood, (*b*) from an intermediary's alimentary canal into the blood of man. They vary in size from the large *sarcocystidæ* in muscle to the most minute forms in the blood *hæmoprotozoa*.

The interest aroused in the intestinal ameba of man is due to their part in the causation of dysentery. Amebic dysentery has been studied at length by Doek, Bass, Osler, Craig and Vedder(1), and as Vedder writes on this subject, we will refer the reader to Section V in Volume III, Chapter XI, "Infectious Diseases."

CESTODES

Tenia Solium.—*Tenia solium*(2)—tapeworm, or pork tapeworm—belongs to the class of cestodes. The habitat of the parasite is typically the intestine of man. The larval form inhabits some other part of the body, often in another host. It is believed that cestodes were known to the ancients, and that the reason why Moses, the first great sanitarian, forbade the Israelites to eat pigs and similar animals was because the parasites were known to exist in their flesh. This worm is not very common in the United States, but is more frequently found in parts of Europe and Asia. When mature, it measures from six to twelve feet in length. It has a very small head, provided with four sucking disks and a double row of hooklets; and hence it is called, in contradistinction from the other form in man, the armed tapeworm.

Tenia Saginata.—*Tenia saginata*(2), or beef tapeworm, is a longer and larger parasite than *tenia solium*. It is beyond question the common tapeworm of this country. It may attain a length of from 15 to 20 feet. It has a larger head than *Tenia solium*. The head is square shaped and provided with four sucking disks, but without hooklets.

Tenia Nana.—*Tenia nana* is the dwarf tapeworm of man, measuring only 10 to 15 millimeters in length, and from 0.5 to 0.7 millimeters in breadth. Owing to its small size, it is often overlooked, but there is no doubt that it often spreads in crowded institutions and indigent communities. The presence of tapeworms causes considerable distress, abdominal pains, nausea, diarrhea, and often becomes the cause of anemia. Occasionally the appetite is ravenous.

The pork and beef tapeworm are made up of many hundreds of segments, which form the body of the worms. These segments gradually increase in size, and the larger ones contain both male and female organs of generation, each segment being supplied with both varieties. These segments are filled with ova—often several thousand—and the coarser particles of food constantly break off segments, which are swept out of the gut along with the fecal matter. Pigs eat the ova and digest them. The ova consist of shells which contain minute embryos with six hooklets. The embryos make their way into the viscera or muscles of the animal, where they lodge and form cysticerci—called *measles*. If imperfectly cooked measles hog flesh is eaten by man, a tapeworm is apt to develop in his intestine.

DIET IN TENIA.—The dietetic treatment of tenia is of more than passing importance. The patient should be placed upon a sparse dietary for

two days previous to administering the teniafuge, during which time the bowels should be well emptied. The evening before taking the anthelmintic, the patient should eat a light supper of bread and milk, or a sandwich, and three hours later, a brisk cathartic should be administered.

The tenicide should be given early the next morning on an empty stomach, as a practically empty intestinal canal affords less protection to the head of the worm, so that the remedy can exert its full effect upon the parasite and cause it to loosen its hold. Two hours later, a laxative should be given, and the patient put on a dietary of bulky consistence, bread, potatoes and coarse vegetables, to be continued for two or three days, keeping the bowels active, when the worm may be completely dislodged and expelled.

The cestodes deserve a few remarks in addition to recommendations as to diet and drug treatment. The *Dibothriocephalus latus*, as Reyher has shown, can bring about a severe progressive and sometimes fatal anemia, which, however, can be cured in a short time by the expulsion of the worm. This anemia is said to be produced through a poison generated by the parasite and absorbed by the intestine. Rosenquist has discussed the protein metabolism in anemia. He pointed out that the presence of *B. latus* produced in the majority of cases an increased protein consumption, to which the blood change generally corresponds, representing a toxic anemia.

The *Dibothriocephalus latus* infects man through the ingestion of insufficiently cooked fresh water fish, and inhabits the small intestine of man. Dietetic treatment is symptomatic. The anemia, of course, is treated dietetically in the same way as ordinary anemia, which is described in Volume III, Chapter VI.

In concluding these remarks on the cestodes, it may not be out of place to quote from the most recent book published on the animal parasites of man by Fautham, Stephens and Theobald. Referring to the treatment of the three large species of cestodes, *Dibothriocephalus latus*, *Tenia solium* and *Tenia saginata*, Braun says it is of a threefold nature: prophylactic, symptomatic and radical. In many circumstances, the best prophylaxis consists in not eating the flesh of those animals in which any of the three larval forms occur, only when so prepared that these are destroyed in the cooking and the food thus rendered innocuous.

For domestic and public use, the rule prescribed by Küchenmeister is in all circumstances most easily understood, namely, to roast or boil till the flesh appears greyish-white and sufficiently done by reason of the coagulation of the albumen and decolorization of the blood. Galli-balerio

very rightly desires the abolition of the custom of manuring fruit-plants such as strawberries, vegetables and salads with the contents of privies. Braun thinks that the easiest of the cestodes to expel is *T. solium*, then *Dibothriocephalus latus*, and the most difficult, *Tenia saginata*.

TREATMENT FOR TENIA SAGINATA.—He recommends the following treatment for *Tenia saginata*. The patient takes early in the evening before the treatment nothing but a plate of soup or a glass of milk, followed by a laxative, so that later in the evening one or two stools are passed. On the following morning the patient should take a cup of black coffee or tea without anything else, and after that the vermifuge.

Fischer prescribes before the treatment two to three or four days' rest in bed; special diet, tablets of cascara sagrada three times daily, on the fourth day senna infusion, and then extract flicis maris in capsules in four doses to be taken every quarter of an hour. According to Goldmann, tenol in the shape of pastilles prepared with chocolate is an excellent vermifuge for children. The method of giving tenol is as follows: On the day before the administration a light diet and thorough purging with calomel are ordered; and then on the day of the treatment itself, after a breakfast consisting of a cup of tea, in the case of adults, thirteen to fifteen tenol pastilles are taken in some red wine at intervals of ten minutes. In the middle of the treatment an interval of some hours is interposed. After the pastilles have been taken, another calomel purge is administered. The dietetic preparation recommended in the first mention of the treatment of tenia in this section is all that is required in the majority of cases.

TREMATODES

Fasciola Hepatica.—*Fasciola hepatica*, otherwise known as the *liver fluke worm*, is almost wholly a disease of the Far East. In severe cases the parasites lead to an acute distomiasis of the liver, sometimes combined with a chronic purulent and ulcerative cholecystitis, with purulent cholangitis and dilation of the bile ducts and numerous small abscesses of the liver.

DIET IN HEPATIC DISTOMIASIS.—The treatment is symptomatic and diet must be regulated with due regard to the symptoms. Prophylaxis is of the first importance in districts in which distomiasis is of frequent occurrence. Only boiled water should be drunk, as the embryos live in water.

Paragonimiasis.—Paragonimiasis, a disease produced by *Paragonimus Ringeri*, or *lung fluke*, is especially endemic in Japan. The disease

usually occurs in the form of pulmonary paragonimiasis, but sometimes the locality of the parasite is in the brain. The prognosis of the pulmonary form is favorable, whereas that of the cerebral form is very doubtful. Drug treatment of the pulmonary lesion is useless, and the chief mode of effecting a cure is by the improvement of the general condition by good food, rest and so on.

DIET IN PULMONARY PARAGONIMIASIS.—Dietetic treatment plays a very prominent part in this disease. The food should be light and nourishing. The dietetic regimen recommended in cases of pulmonary tuberculosis will, as a rule, suit admirably in the treatment of lung fluke disease. Prophylaxis consists in general management, cleansing and, if necessary, boiling everything that is eaten or drunk.

Conorchis Sinensis.—The disease caused by *Conorchis sinensis* is only found in China and Japan. It is a deadly disease and the treatment is purely symptomatic. Prophylaxis consists in the prohibition of drinking unboiled water or eating uncooked shellfish or fish taken from canal water.

Bilharziasis.—Bilharziasis, caused by the *Schistosoma hematobium*, is a frequent, troublesome, and often fatal disease in the Far East, especially in Egypt. Its symptoms are chiefly exhibited in the urinary apparatus. The course of the disease is chronic, and in slight cases the prognosis is not unfavorable. In severe cases, the issue is generally fatal.

DIET IN BILHARZIASIS.—Dietetic treatment is symptomatic, but prophylaxis is of great importance. Only well-filtered water should be drunk and only boiled water used for washing.

NEMATODES

Ankylostomiasis.—Ankylostomiasis, or *uncinariasis Americana*, is caused by *Ankylostoma duodenale*. This disease is fairly common in parts of America and is more or less prevalent throughout the world. Infection in human beings takes place by the mouth, through the eating of uncleansed vegetables and other insufficiently cleaned articles of food or the putting of food into the mouth with soiled hands.

DIET IN ANKYLOSTOMIASIS.—Stiles(3) has pointed out that in ankylostomiasis, the appetite varies from slight to ravenous, and in later stages there may be complete anorexia. In the dietetic and therapeutic treatment of this disease, it is well to clear out the bowel the day before the administration of thymol, the usual anthelmintic, and to place the patient for the time being on a liquid diet. As the parasites are more or less protected by the mucus and food in the intestine, these should be re-

moved by administering magnesium or sodium sulphate, or some other purge, with abundant water, the evening before the anthelmintic is given, early the next morning. No breakfast is allowed; at six o'clock give to an adult 30 grains of finely powdered thymol in capsules, and at 8 o'clock repeat this dose; at 10 o'clock administer another dose of salts. For the treatment of the anemia, which is a prominent feature of uncinariasis and often is very persistent, iron and arsenic are indicated as blood restorers. The dietetic management of these patients must, for a time, be very carefully conducted. In serious ankylostomum disease, a rich, full dietary is to be avoided until the powers of digestion and absorption have become re-established; otherwise, enteritis and diarrhea may prove very troublesome and retard recovery, or perhaps prevent it altogether.

The following dietary has been quite satisfactory in the author's hands for the first few weeks:

SUITABLE DIETARY IN CASES OF ANKYLOSTOMIASIS AMERICANA

	Calories
<i>Breakfast</i> —7 A.M.	
2 eggs (soft boiled).....	160
Butter, 10 gm.....	81
Toasted bread, 50 gm.....	130
Milk, 300 c.c.....	202
<i>Lunch</i> —10 A.M.	
Milk, 300 c.c.....	202
Crackers, 50 gm.....	166
Butter, 20 gm.....	162
<i>Dinner</i> —1 P.M.	
Lamb chops (broiled), 50 c.c.....	60
Mashed potatoes, 50 gm.....	44
Toasted bread, 50 gm.....	130
Butter, 10 gm.; 1 cup of bouillon, 200 c.c.....	81
<i>Tea</i> —4 P.M.	
The same as at 10 A.M.....	530
<i>Supper</i> —6.30 P.M.	
Milk with farina, 300 c.c.....	342
Crackers, 50 gm.....	166
Butter, 20 gm.....	162
9 P.M.	
Milk, 300 c.c.....	202
TOTAL CALORIES.....	2,820

Ascariasis.—Ascariasis(4), caused by *Ascaris lumbricoides*, or whip-worm, frequently occurs in adults and children, and is one of the com-

monest parasites in the tropics. A pure water supply is the best means of prevention. Oxyuriasis is due to *oxyuris vermicularis*. Dietetic treatment in both conditions is symptomatic. With regard to prophylaxis, Metchnikoff's directions should be borne in mind, that badly washed vegetables, salad, etc., should not be eaten, and further, that strict cleanliness in general must be observed.

The dietetic treatment of all the animal parasitic infections is of secondary importance. It is not so much what to eat and drink as what not to eat and drink. They are the diseases in which prevention takes the first place. Such diseases, however, are invariably weakening and frequently produce severe anemia, in the treatment of which, diet is of very considerable importance. The dietetic treatment generally is symptomatic.

Oxyuris Vermicularis.—*Oxyuris vermicularis*(5) is the pin or thread worm, and occurs, as far as is known, only in man and all the world over. It finds a natural habitat in the lower extremity of the small intestine, the gravid females descending through the cecum into the large bowel. It is a minute white round worm which looks like short pieces of white thread. Their presence in the sigmoid section of the colon causes considerable catarrhal inflammation, and they are often very difficult to eradicate, resisting treatment for many months.

DIET IN OXYURIASIS.—The first step in the treatment of this disorder is thoroughly to cleanse the bowel of mucus, which may be dislodged by high rectal injections of boric acid solution, as previously outlined in Volume III, Chapter XXVI, page 726. While these injections are important and indeed invaluable, they cannot be exclusively relied upon. The most scrupulous attention to cleanliness, as the first step in the treatment of all cases, is absolutely necessary. The anal region should be bathed with a 1 to 10,000 bichlorid solution after each stool. The cleansing elyster of boric acid should be followed by a high injection of bichlorid in the strength just mentioned, to be retained as long as possible. This should be repeated every third night. Infusions of quassia, *asafetida* and aloes are also used with success. When the worms are in the dependent portion of the small intestine, drugs by the mouth must be combined with the injections. A well-balanced dietary is important; milk, eggs, toast, fish, fowl and easily digested vegetables are indicated.

Filaria Medinensis. — *Filaria medinensis*(6) — commonly called the guinea worm—has been known since the most remote periods and was in all probability "the fiery serpent" mentioned in Holy Writ by Moses, who apparently knew the method of twisting the worm out of the body with a stick, as he appears to have made a model of this method of extraction.

Galen called the disease caused by these worms, *dracontiasis*. This disease is common in Persia, India, tropical Africa, and to some extent in Brazil. The habitat of the female is in the connective tissue of the limbs and trunk. The method taught by Moses was to attach the protruding part of the worm to a stick, and wind it out slowly day by day. Sometimes this was successful, but occasionally the worm would snap asunder, which was a disastrous consequence. Myriads of the young escaped from the ruptured ends into the tissues, producing violent inflammation and fever followed by abscess and sloughing. If the guinea worm be protected from injury, and the part she occupies frequently doused with water, the uterus will gradually reach the surface and be emptied of its embryos. Emily, a French navy surgeon, devised a method of treating this condition by means of antiseptic solutions of bichloride of mercury in strengths of 1 to 1,000, which effectually kills the parasite. The prevention is merely a question of protection of the drinking water from pollution by subjects infected with the guinea worm.

DIET IN GUINEA WORM DISEASE.—The dietary for patients recovering from this malady should be very nourishing and readily assimilated. All water should be boiled.

Trichocephaliasis.—Trichocephaliasis, or whip-worm infection, is an infection of the large intestine, appendix, or ileum, which produces no symptoms unless the worm is present in large numbers, giving rise to anemia, with nervous and gastro-intestinal symptoms. This infection so far as is known affects only man and monkeys. It is transmitted by the ova escaping in the fecal discharges. It occurs most frequently among children. The treatment at the present is thymol by the mouth and an enema containing solutions of benzine per rectum. Prophylaxis is of first importance; good sanitation and the proper disposal of sewage, combined with cleanliness in the preparation of food, including personal cleanliness, constitute the most important precautionary measures.

DIET IN WHIP WORM INFECTION.—Uncooked vegetables and the skins of fruits should not be eaten. Good wholesome food that is easily digested is of great importance in the dietetic treatment.

Trichinosis.—Trichinosis(7), due to the ingestion of flesh containing trichinæ, is responsible for gastric disturbances of various kinds. Drugs are of little avail, but after the parasites have left the lumen of the intestine, all treatment must be symptomatic and supportive.

DIET IN TRICHINOSIS.—The same principle of dietetic treatment may be applied as is employed in that of continued fevers. Attention must be directed to maintaining the strength and the state of nutrition, special

symptoms being treated as they arise. In Germany, where it is to some extent the custom to eat uncooked pork, the systematic examination of hog's flesh is conducted by experts. Thorough cooking is the best means of preventing trichinosis. The trichinæ are not particularly resistant to heat, being killed at 155° F. unless encapsulated; otherwise, at 158° to 160° F.; that is, they have about the same resistance as non-sporulating bacteria. The disease is very common in Germany, and of the 6,329 cases occurring in that country between 1881 and 1898—over 32 per cent—2,042 cases were traced by Stiles to meat which had been inspected and pronounced safe and free from trichinæ. Our own Federal meat inspection is not of much value, as the very low-powered microscopes used do not always reveal the parasite. Formerly all pork dressed for export was examined by the microscopic method, but this has recently been discontinued.

The Bureau of Animal Industry sounds the following warning:

No method of inspection has yet been devised by which the presence or absence of trichinæ in pork can be determined with certainty, and the Government meat inspection does not include inspection for this parasite. All persons are accordingly warned not to eat pork, or sausage containing pork, whether it has been officially inspected or not, until after it has been properly cooked.

A temperature of about 160° F. kills the parasite, therefore pork when properly cooked may be eaten without danger of infection. Fresh pork should be cooked until it becomes white and is no longer red in color in all portions of the piece, at the center as well as near the surface. Dry-salt pork, pickled pork and smoked pork previously salted or pickled, providing the curing is thorough, are practically safe so far as trichinosis is concerned, but as the thoroughness of the curing is not always certain, such meat should also be cooked before it is eaten.

Filaria Sanguinis Hominis.—*Filaria sanguinis hominis*(8) is a blood worm living in the circulatory tract of man. Manson discovered in 1878 that the parasite is spread by mosquitoes; he formerly believed it to be transmitted through drinking water. Observations have definitely proven that, like the malarial parasite, the filaria is introduced into its human definite host by the mosquito bite. Whether it may obtain an entrance through any other channel or not, would be hard to prove and equally rash to deny.

The diseases known to be produced by the filaria are: abscess(9); lymphangitis; varicose groin glands; varicose axillary glands; lymph scrotum; cutaneous and deep lymphatic varix; orchitis; chyluria; elephantiasis of the leg, scrotum, vulva, arm, mamma and elsewhere; chylous dropsy

of the tunica vaginalis; chylous ascites; chylous diarrhea, and probably other forms of disease depending on obstruction or varicosity of the lymphatics, or on death of the parent filariæ.

TREATMENT OF FILARIASIS.—The treatment of filariasis is largely symptomatic, depending upon its location and distribution. The dietetic management should be supportive and directed towards a nourishing and sustaining bill of fare.

REFERENCES

In the preparation of this section, the author has derived much help and drawn largely from the following published works:

1. VEDDER, ED. B. J. Trop. Med. and Hygiene, p. 190.
2. STILES and HASSELL. U. S. Dept. Agric., 1898, Bull. 19.
——— and FRANKLAND. U. S. Dept. Agric., Bull. 35, p. 35.
3. ———. Hygienic Lab., U. S. Pub. Health Reports, Hygiene Lab., Bull. 10.
———. Am. Med., vol. iii, p. 777.
BENTLEY. Ankylostoma, Brit. Med. J., 1902, p. 1900.
4. CASTELLANI. Brit. Med. J., 1907.
BENTLEY. Brit. Med. J., 1907.
CASTELLANI. Ascaris lumbricoides, Brit. Med. J., 1907.
5. BLANCHARD. Arch. f. Paras., 1906, x, 404.
———. Oxyuris vermicularis, Arch. f. Paras., x, 404, 1906.
6. BASTIAN. Filaria medinensis, Transactions of the Linnean Society of London, xxiv, 101, 1863.
7. OWEN. Trichinella spiralis, Transactions of the Zoological Society of London, p. 315, 1835.
STILES. Trichinella spiralis, U. S. Dept. Agric., Bur. Animal Indust., 1901, Bull. 30, Washington, Proc. Path. Soc. Phila., iv, 137.
8. MANSON. The Filaria sanguinis hominis, London, 1883.
9. PROUT. Filaria in the Production of Disease, J. Trop. Med., 1908.

CHAPTER XVI

DIET IN VARIOUS TOXIC CONDITIONS

E. H. BARTLEY, B.S., M.D., F.A.C.P.

Alcoholic Poisoning: Effects of Alcohol upon the System; Diet in Alcoholism; Delirium Tremens; Acute Hallucinosiis; Acute Wood Alcohol Poisoning.

Metal and Drug Poisonings: Arsenical; Copper; Cocain; Opium; Morphin; Acute Iodism; Lead; Nicotin; Mercurial; Phosphorous; Tin; Zinc.

ALCOHOLIC POISONING

Effects of Alcohol upon the System.—Chronic alcoholism is usually distinguished by physical and mental debility, by chronic catarrh of the throat, larynx, stomach and intestines, and alcoholic tremor. It is a more or less prominent factor in the causation of numerous organic diseases, including cirrhosis of the liver, contracted kidney, myocarditis, cerebral disease and peripheral neuritis. The latter is a clear example of a disease resulting from either the direct toxic effect of alcohol, or an indirect effect through disturbances of digestion due to the beverage. The effect of an excess of alcohol, or of the continuous ingestion of alcoholic beverages, is, as a rule, most markedly exhibited upon the *nervous system*. However, the effect of alcohol is always largely governed by the individual himself, his temperament, constitution, mode of life, whether sedentary or out-of-door, the climate, and the amount of exercise taken.

Again, it makes a great deal of difference *what form of alcoholic drink is consumed*. Light beer and light wines naturally do not exert the deleterious effect of strong spirits. The beer and wine drinker seldom suffers from acute alcoholism, but beer taken in excess is apt to interfere with the *digestive processes* and to act as an irritant on the alimentary tract, bringing about gastritis and other disorders of digestion.

There is reason to believe that the *harmful effects of alcohol on the tissues* have a more complex origin than is generally assumed. As Wat-

son has pointed out, they are in all probability due, not only to the direct toxic effects of alcohol on the tissues, but to its indirect influence in promoting an abnormal bacterial activity in the intestinal canal, with resulting absorption of toxins. The statement seems to be well founded that intestinal stasis causes intestinal putrefaction and that this condition in its turn in many instances causes alimentary toxemia, which means that toxic substances are absorbed from the intestines into the circulation and produce a poisoning of the system. Excess of alcoholic beverages, and even comparatively small amounts of alcohol, will in some persons disorder the digestion and, in course of time, if the habit of drinking alcohol be persisted in, will eventuate in the absorption of toxins to such an extent that the entire organism becomes permeated with poisonous substances. The exact etiology of diseases like disseminated sclerosis, combined sclerosis, and so on, is unknown; the extent of our knowledge goes no further than the supposition that they are the result of a toxic condition of the blood. Thus, if alcohol can act as a disturber of digestion, and with other dietetic errors bring about alimentary toxemia, it becomes a factor of considerable importance in the indirect causation of certain chronic inflammatory diseases of the nervous system. Alcohol thus has both a direct and indirect effect on the nervous system, and the fact may be emphasized that *the main and most injurious effects of alcohol are upon the nervous system.*

The following clinical facts suggest the possibility of the correctness of this view. In many cases of nervous disorders, the clinical history shows that decided gastro-intestinal disturbance precedes the development of the nervous symptoms. This usually exhibits itself as flatulence, constipation, diarrhea or "bilious attacks." Examination of the stools of those suffering from a condition of this kind, shows them to be ill-formed and very fetid, indicating an unusually septic state of the alimentary tract. It is well known that alcohol is a potent factor in causing disorders of digestion and disordered metabolism. Into the action of alcohol upon the muscular system, there is no space to enter here, but the statement of Sir Frederick Treves may be aptly quoted on this point: "As a work producer alcohol is exceedingly extravagant, and like all other extravagant measures, leads to physical bankruptcy."

Before discussing diet in chronic alcoholism, we may say a few words on *blood pressure* in chronic alcoholism. Chronic alcoholism is associated with a variable blood pressure, depending upon the extent to which renal and cardiovascular changes have occurred. But alcoholics in whom these organs are sound, show, when abstinence has been enforced, a marked

rise of the systolic pressure followed after a few days by a gradual fall. The diastolic pressure is constantly high. Raff finds these results so constant as to be of diagnostic value in differentiating between *alcoholism* and *functional neuroses*.

Diet in Alcoholism—DIET IN CHRONIC ALCOHOLISM.—With regard to diet in chronic alcoholism, it can be said of this, as of many diseases, that it is best to prevent it from becoming chronic. However, while such advice is excellent, the province of a work of this nature is mainly to recommend a diet calculated to better the condition of a chronic alcoholic.

Alcoholic poisoning differs in its effects as the poisoning is acute or chronic, and in accordance with the previous alcoholic habits of the patient. As with most drugs, a certain amount of tolerance is gained by the habitual taking of alcohol. *Tolerance to alcohol* can also, to a certain extent, be inherited. Races which have been for generations consumers of alcohol, have acquired tolerance, and such races are able to drink amounts of alcohol which would kill or seriously injure races which have been abstainers, or have only drunk alcohol in mild forms.

The *continued use of strong spirits*, and to a lesser degree the occasional taking of alcohol in excess, almost invariably results, sooner or later, in chronic gastric catarrh. The mucous membrane of the alimentary tract, from long continued irritation, becomes covered with a thick, viscid, ropy mucus, and atrophy of the gastric glands is a frequent accompaniment. All the symptoms of indigestion are present, although these vary somewhat in different individuals. The stomach is the chief sufferer from the local irritant effect of alcohol, although the intestines, as pointed out above, share in the pathological changes, and indirectly alcohol may assist in causing a poisoning of the system by means of its disturbing effects on intestinal digestion.

The effects of alcohol on the will power are among its most deplorable features, and this is evidenced most among the so-called "periodical drinkers." These individuals will often refrain from indulgence for months, and even for years, but when the craving returns, it is almost irresistible and may be compared to intense hunger, although its effect on the will power is by far more disastrous. By many authors this is believed to be a disease with periodic exacerbations.

DIET IN MILD ALCOHOLISM.—The dietetic treatment of the milder cases of alcoholism, characterized by nervousness, muscular tremors, foul breath, coated tongue and urine loaded with urates or crystalline deposits, is more or less simple, provided the patient is amenable to good advice or is under such restraint that he will not take alcohol, or will not be allowed

to take alcohol. It is excellent practice then to flush the kidneys with abundant amounts of water or alkaline effervescing drinks, combined with brisk catharsis and a suitable diet. By these means an acute attack may be prevented. There are those who still advocate the old methods of treating alcoholics, by giving them spirits or alcohol in some form for a time, but gradually weaning them from such beverages. However, the better way in which to manage those suffering from the effects of a debauch of strong liquors is to prohibit the use of alcohol at once.

It is somewhat of a debatable point what kind of food to give at first. There is a strong craving for highly seasoned and spiced foods, and the question is, should this desire for condiments and so forth be indulged in for a short time? It is the general practice now to omit highly seasoned foods, but as soon as an alcoholic is placed under treatment, to order a bland, soothing diet, in which milk as a rule should be the principal aliment. Some fruits are useful as an antidote against the craving for drink, and this is especially true as regards apples. Therefore apples should be allowed.

The following dietary is recommended as appropriate for mild cases of alcoholism:

DIETARY IN MILD ALCOHOLISM

Breakfast.

A lightly boiled egg or a small portion of white fish, or of bacon, or a light savory omelet; toast, or bread and butter; a cup of weak tea or of coffee and milk.

Dinner—1 P.M.

A slice of roast mutton, or the wing of a chicken, or a plain cutlet, with a spoonful of mashed potato and some well-boiled green vegetable. A few teaspoonfuls of any plain milk or bread pudding, with occasionally some stewed fruit. Beverage: a glass of plain or aerated water, to be taken slowly.

Tea.

A cup of tea may be allowed, with toast or rusk.

Supper—7.30 P.M.

A meal of fresh fish, or of bird, or of tripe, with dry boiled rice or bread. Beverage: small glass of milk and soda water or Vichy.

In many cases of alcoholism, while the obvious and immediate effects on the nervous system may be mild, yet the effects on the digestive organs are extremely severe. This is especially so when the sufferer has not become habituated to the use of alcohol. In such instances, until the stomach regains tone, and nausea and vomiting have disappeared, a liquid diet is perhaps most suitable, and when well borne, milk is the most appropriate form of liquid food.

DIET IN PERIODIC ALCOHOLISM.—In cases of periodic alcoholism, in which there is no inordinate or indeed, as a rule, no desire whatever for alcohol between the attacks, a non-stimulating diet is believed by most authorities to be the best. Fruits, plainly cooked cereals, and vegetables should constitute the staple diet, according to Gilman Thompson, and animal food should be eaten only in moderation. There are those who hold that the consumption of meat in large quantities predisposes to drink, and that the proper treatment for those addicted to drink is to withhold meat as far as possible. Although undoubtedly great drinkers are often also large meat eaters, this is by no means universal. For example, in Australia, where probably more meat is eaten per capita than in any other part of the world, the favorite beverage and that most largely drunk is tea. Climate plays an important rôle in those countries in which meat and alcohol are the popular articles of diet. Nevertheless, a relationship apparently exists between the consumption of meat and alcohol, and it is perhaps sound advice to restrict the use of meat in those who are in the habit of drinking to their detriment.

DIET IN SEVERE CASES OF ALCOHOLISM.—The dietetic treatment of severe cases of alcoholism in which the nervous symptoms are not especially marked, but in which dyspeptic or gastro-intestinal symptoms predominate, is that of acute gastritis or gastric catarrh, according to the symptoms presented.

DIET IN ALCOHOLIC GASTRITIS.—In the treatment of alcoholic gastritis, the first aim is to relieve the pain and vomiting. In some cases, it may be necessary to give the stomach a complete rest, and feed by nutrient enemata, allowing only water, carbonic water or alkaline effervescent waters and milk of magnesia to be taken by the mouth for twenty-four hours. In most cases, however, slightly salted albumin water given in very small quantities, frequently repeated, will quiet the vomiting. This may be assisted by whey or gelatin water given in the same manner. Barley water, arrowroot water or rice water may then be given. When these bland fluids can be retained, a single bite of toasted bread or cracker, eaten dry, may be tried. Whatever is given must be in very small quantity, often repeated. Buttermilk is usually well borne after the vomiting is allayed by the above bland fluids. Beef tea or Valentine's meat juice may also be given at this time. The selection of food must be made with extreme care, and the sensations of the patient will usually be a safe guide in returning to solid food. "Make haste slowly" is wise counsel.

DIET IN GASTRIC CATARRH.—The diet in gastric catarrh must be adapted to the degree of inflammatory or cirrhotic changes which have al-

ready taken place in the various organs. In the mornings such patients usually have an actual distaste, almost a loathing, for food, but in the course of the day they may to a certain extent recover their appetite and powers of digestion. The following list of foods forms a suitable dietary, well adapted to this stage of chronic alcoholism:

DIETARY SUITABLE FOR ALCOHOLIC GASTRITIS

Breakfast—8 A.M.

A cup of weak tea with an egg beaten up in it, and a slice of toast.

Lunch—10.30 A.M.

A cupful of good meat soup, thickened, or a cup of peptonized milk, warmed with toast or rusk.

Dinner—1 P.M.

A tablespoonful of pounded meat on toast, or a small teacupful of fresh meat juice, with fingers of toast; a couple of spoonfuls of sago, rice or tapioca pudding. Beverage: half a tumblerful of milk and soda water (equal parts).

Afternoon Tea—4.30 P.M.

A cup of weak tea or of cocoa nibs, with rusks or a plain biscuit.

Supper—7 P.M.

A cup of soup or of mutton broth, as at the forenoon meal.

9.30 or 10 P.M.

A cup of peptonized milk and a slice of thin bread and butter.

Food during the Night:

In case of wakefulness, there should be within reach and arranged so as to be readily warmed, peptonized milk.

Delirium Tremens.—Onset usually sudden. Disordered intellect, often reaching a condition of active maniacal excitement accompanied by hallucinations—visual and otherwise—insomnia, terrors and intense nervous strain. In the earlier stages the heart action may be apparently vigorous and the pulse full and bounding, but the heart is very apt to become suddenly exhausted and cardiac failure is to be feared.

G. W. Norris says with regard to blood pressure in delirium tremens that in the asthenic type of case, the systolic pressure is uniformly low and the pulse pressure small. A reëstablishment of normal relations goes hand in hand with the subsidence of delirium. This would indicate that the height of the blood pressure, through its effect on the cerebral circulation, bears a causal relation to the delirium, a statement which is further borne out by the fact that if more normal values can be temporarily established, by whatever means, symptomatic improvement occurs.

DIET IN DELIRIUM TREMENS.—Dietetic treatment of delirium tremens consists, in the first instance, as in all cases of alcoholism, in empty-

ing the bowels of any accumulation of abnormally fermenting food. In the earlier stages, strong purgatives or even better, evacuating enemas, should be given. If the stomach be overloaded with undigested food, it is often well to administer ipecac, or some other suitable emetic, in order to produce free emesis. Large draughts of water, or aerated and saline waters, should be taken to promote the activity of the kidneys and dilute the poison in the system, and hasten its elimination. After the alimentary canal has been sufficiently cleared, food should be given, at first in fluid form, frequently, and in small quantities. In the case of delirium tremens, Gilman Thompson thinks that the food should be stimulating and predigested. When gastro-intestinal irritation is evident, pancreatized milk, strong meat soups, beef tea with dropped eggs added to it, and egg albumin may all be given. The mucous membrane of the stomach has so long been accustomed to the stimulating effect of strong alcohol, that if this is suddenly or completely removed, gastric discomfort and craving for drink become intolerable.

This condition is often relieved by using strong spices and condiments, such as ginger or Cayenne pepper, in quantities which would be injurious to a normal stomach. These substances may be added to food and non-alcoholic drinks, although the stomach may be actually inflamed. Gilman Thompson states that experience proves that highly seasoned food is sometimes borne with the effect of diminishing the suffering of the patient. However, Thompson puts in the reservation that this applies, of course, only to very robust persons, in whom a vigorous constitution has been abused by excessive indulgence in drink, and the gastric stimulant should not be long continued.

With regard to the above views, as remarked when discussing chronic alcoholism, it is a disputed point as to whether it is beneficial in the long run even at first to give the patient highly seasoned foods. It is true that he craves such a diet, but often in the same stage of the condition he craves alcohol even more ardently. In the opinion of the majority of those experienced in the treatment of alcoholics, and in a position to speak with authority on this point, the best plan is to stop alcohol at once and completely. The author thinks that while in certain cases it may do no harm to give condiments and highly seasoned food for a short time, it does no particular good, and on the whole a bland, nourishing diet meets all the exigencies of the situation in a most satisfactory manner.

H. D. Rolleston, writing on the dietetic treatment of chronic alcoholism(1), says that the first step is the complete withdrawal of all alcoholic drinks and that there is no proof, as has been so frequently asserted, that

delirium tremens may be precipitated by sudden and complete withdrawal of alcohol in any shape or form. He advises that strength be sustained by simple food, if necessary, beginning with peptonized milk, and then advancing to solid food. Feeding may be difficult from want of appetite or from vomiting, but perseverance and tact on the part of the nurse will usually overcome both these disabilities.

The cardinal points in the treatment of delirium tremens are food, sleep, management and restraint. Feeding is of the first importance, seeing that the patient is in a half-starved condition, and, as a rule, has taken little or no food for a considerable period before the onset of acute symptoms. Careful feeding from the start is very important, both for immediate relief, and to prevent exhaustion and cardiac failure in the later stages of the disease. Anorexia and unwillingness to take food require more tact on the part of the attendants in delirium tremens than in the case of chronic alcoholism. Occasionally, forced feeding by gavage may be necessary, when a nasal tube should be passed and fluid food thus introduced into the stomach at intervals of not more than three hours. Beef tea, peptonized milk, soups or broths, if acceptable, pounded fish or minced meat should be given. Care should be taken, however, not to overload the stomach, the digestive powers of which are almost certainly much impaired by chronic catarrh. Vomiting must be combated by iced effervescent draughts, and by careful feeding with small quantities of suitable food, and if it persist, nutrient enemata or suppositories may be employed. It has been suggested that a pint of beer or porter may be the best hypnotic in delirium tremens. Rolleston thinks that even if this be so, it is not a wise procedure, as the administration of alcohol tends to keep up the drink craving and should be interdicted.

Ginger ale, in Thompson's opinion, constitutes a very serviceable non-alcoholic beverage which in part relieves the craving for stronger drink. It may be drunk in considerable quantities, and possesses the advantage of being somewhat laxative, diuretic and mildly stimulating to the stomach. In all cases of alcoholism, whether mild, severe or acute, the object should be to nourish the patient as much as possible, and in delirium tremens this course is most essential. The nervous system is strengthened and soothed by abundant nourishment. Food should be of the most highly nutritious character and adapted to each individual case. In a general way, milk is the most useful form of diet, especially in early and acute stages, and good soups and beef teas have their value in stimulating appetite.

Acute Hallucinosi of Drunkards.—The most common form of subacute delirium is that in which hallucinations of the sense of hearing are

conspicuous. Patients subject to these hallucinations are, as a rule, of a nervous, high-strung temperament and generally well educated. The attack usually comes on four or five days after the consumption of alcohol has ceased. The patient is usually irritable; sleeplessness and restlessness are prominent features, and the hallucinations become more frequent and imperative. When the psychosis is at its height, the patient is persistently disturbed by voices which claim his attention, and he puts into the mouths of those about him his own thoughts. Especially if he has had anything disagreeable on his mind, he will be obsessed by this one idea and will imagine that everybody is talking about his affairs. Sometimes so great will be the terror aroused by such hallucinations, that unless great care be taken, the sufferer may commit suicide.

DIET IN ACUTE HALLUCINOSIS.—A. D. Blackader(2) points out that an attack of this nature may follow mental shock or some acute gastric disturbance. Probably the condition of the stomach and the intestines has a good deal to do with the initiation of an attack, and consequently special attention should be paid to the stomach and bowels. It goes without saying that the diet should be nutritious, but until the alimentary tract is purged of its irritating contents, little if any food can be assimilated. The diet should at first be liquid, and as soon as the digestive process has regained in some degree its normality, easily digested food should be given at frequent intervals. At first hypnotics are necessary; afterwards, massage and hydrotherapy should be substituted.

Alcoholic polyneuritis and Korsakow's psychosis will be discussed under the head of nervous diseases.

Acute Wood Alcohol Poisoning.—Wood alcohol, also known as methyl alcohol, Columbian spirits, wood naphtha, etc., largely employed in certain industries, is a most dangerous poison when taken internally, owing to the fact that it is very slowly excreted from the body, and under certain conditions apparently converted into the highly toxic formic acid, occasionally with fatal results. It is very much cheaper than ethyl or grain alcohol, and unscrupulous manufacturers sometimes use it as a substitute for ethyl alcohol in flavoring and medicinal extracts. It has also been substituted for ethyl alcohol by saloonkeepers with lamentable consequences.

The intoxication produced by methyl alcohol resembles in its first stages that brought about by whiskey, but it is considerably more protracted and may be characterized by convulsive movements. Later effects are influenced by the quantity of alcohol that is changed into formic acid in the body. Many escape without any especially untoward results; some, however, are rendered totally blind, while in others the intoxication

terminates in death. According to Blackader, the injury to the ocular tissues is mainly a destructive inflammation of the optic nerve fibers or retinal filaments, succeeded by atrophy. Both eyes are affected. The blindness may develop in a few hours after the poison is taken, or after the lapse of several days. Slight temporary improvement may take place in some cases after several days; however, in 90 per cent of the patients whose eyes are affected, blindness both total and permanent develops. Prognosis is invariably uncertain, and it does not seem to be wholly dependent upon the quantity ingested.

TREATMENT IN ACUTE WOOD ALCOHOL POISONING.—Treatment is unsatisfactory and in severe cases ineffectual. As promptly as possible, the stomach should be evacuated by the best means at hand. A dram of compound jalap powder or an ounce of magnesium sulphate will induce free catharsis. Following this, measures for promoting diaphoresis, a hot pack or hot bath or the administration of pilocarpin, are in order. Solutions of sodium or potassium bicarbonate, either hot or cold, should be given in generous quantities; and a milk diet should be instituted. Speaking generally, the diet in cases of wood alcohol intoxication should be of the same character as that most appropriate for other forms of alcoholism.

METAL AND DRUG POISONINGS

Arsenical Poisoning.—Arsenical poisoning, from the dietetic point of view, requires but little consideration. Chronic arsenical poisoning is an industrial disease and is acquired in arsenic works, smelting works, glass factories, or from arsenical fabrics, papers and artificial flowers. It brings about conjunctivitis, chronic gastro-intestinal catarrh, obstinate diarrhea, eczema and cutaneous ulcerations, anemia, cachexia, falling out of the hair, and loss of sleep. When administered in small doses, arsenic acts as a tonic by gently irritating the stomach and thereby provoking appetite. It is a poison not infrequently used with criminal intent, as its effects, when given in small quantities in the food for a prolonged period, produce severe irritation of the alimentary tract, simulating the symptoms of grave gastro-intestinal catarrh and consequently difficult of detection. The most common form of arsenical poisoning is subacute, and undoubtedly the prolonged administration of arsenic, even in small doses, must induce changes in the nervous system.

DIET IN ARSENIC POISONING.—The dietetic treatment of arsenical poisoning is purely symptomatic, and of course when gastro-intestinal irri-

tation is produced thereby, diet alone can do little good unless the arsenic is eliminated. The diet must be the same as that given for gastro-intestinal disorders generally, that is, of a bland, soothing character, calculated to relieve the irritation. Milk should form the basis of a diet for arsenical poisoning which has affected the alimentary tract.

Copper Poisoning.—The symptoms of acute copper poisoning are vomiting of greenish matter, colic, tenesmus and bloody stools. Nervous symptoms are also present, in form of headache, vertigo, anesthesia, paralysis, delirium.

TREATMENT IN COPPER POISONING.—In the treatment, white of egg, milk and wood charcoal are employed. Milk and eggs are efficient antidotes in acute poisoning. Eggs should be beaten in water or milk and given as long as vomiting continues. Chronic copper poisoning is comparatively rare, and little harm is done to those who work in sulphate of copper. There is a disease, though, known as “brassfounders’ ague,” which is apt to attack men who work in brass-founding factories. Brass workers often suffer from gastro-intestinal disturbance, nausea and vomiting, a metallic taste in the mouth, colic, constipation or diarrhea, headache and muscular pains. The diet should be similar to that recommended for gastro-intestinal troubles, and alcohol should be avoided.

Cocain Poisoning.—Cocain is derived from the *Erythroxylum coca*. The use of it by the inhabitants of the Pacific side of South America goes back beyond historical times, and under the name of “spadic” and other names, the leaves are largely used at the present time by Peruvians and other tribes of western South America. The leaves are chewed and mixed with lime, and in the habits of these races they seem to take the place that tea, coffee and cocoa do with us. Under the influence of the drug, the Indian of South America is said to perform rapid and long journeys, or to carry heavy loads on very small quantities of food. The abeyance of appetite is probably due to the benumbing effects of the drug on the coats of the stomach. Among the Indians the drug is said to endow the laborer with extraordinary powers of endurance, besides exerting the cheering and exciting effects of a nerve stimulant.

According to Allbutt, the slavery of cocain is worse than that of morphin, and indeed this fact is well known to those who have come into contact with individuals suffering from chronic cocain poisoning. It is more destructive in its effects to mind and body and is harder to overcome. The only possible means of dealing with a cocainist is to place him in a retreat for the care of such cases where he can be handled with sympathy and skill. Chloral and trional are useful drugs in combating

the sleeplessness and distress incident to its withdrawal, while massage and feeding aid in repairing the wasted tissue.

DIET IN COCAIN POISONING.—As is the case with morphin addicts, the system of the cocainist requires to be built up. With this object in view, a generous and highly nutritious diet is indicated. The diet recommended for morphinists will excellently serve the purpose of the cocainist. As with the morphinist, rest and diet should be the main features of treatment of the cocain habitué. The nervous system of the confirmed cocain addict is more severely shaken, as a rule, than that of the morphinist, and the sole aim must be to repair as far as possible, by rest and diet, the injuries inflicted on his entire organism by his destructive vice.

Opium Poisoning.—Opium, next to alcohol, is the most pernicious and extensively used intoxicant. It may even be said, without exaggeration, that the habitual use of opium is more harmful to body and mind than the use of alcohol(2), and that there are almost as many persons addicted to opium in its various forms as to alcohol. The consumption of opium in the Far East is enormous. The population of China and India alone aggregates something like 700,000,000, and the majority of these, when they can afford to do so, are opium takers; some conception can thus be formed of the prevalence of the habit in Asia. In Europe and in America, and among the white races generally, opium or morphin taking is on the increase, although it is not so universally used as in the East. However, there is one point which should be taken into account when discussing the evil effects of opium and its alkaloids. The yellow and dusky inhabitants of Asia appear to have gained a considerable degree of tolerance for the drug. Sir William Roberts, who studied the question very carefully when in India, concluded that its mischievous effects were not so grave as commonly believed, and was of the opinion that under certain conditions of native life, its use might be beneficial. Kipling, who although not a scientific investigator is a remarkably accurate observer, stated that from his intimate knowledge of Indian life, he thought that the ill effects of opium taking among the natives are greatly exaggerated, and agreed with Sir William Roberts that in some instances its use might be beneficial.

The explanation of this tolerance no doubt is that in generations of opium taking, the system has become to a great extent habituated to its use. In the same way, those races which have drunk alcohol for generations have inherited a tolerance for the drug. Still this is not an argument in favor of either alcohol or opium, as both have caused and are causing incalculable harm. Moreover, as a rule, Eastern peoples can use opium

in moderation, and it is the exception there for the natives to indulge in debauches of the drug. Such is not the case with the white man, who almost invariably becomes a slave to the habit and in nine instances out of ten is more irretrievably ruined, body and soul, than if he were a confirmed alcoholic drunkard. As Blackader points out, the employment of the narcotic with a white person is always playing with fire, and the chances are that the game will end in disaster.

TREATMENT OF ACUTE AND CHRONIC OPIUM POISONING.—Poisoning by opium or its alkaloid, morphin, presents itself to the physician in two forms—*acute*, when a poisonous dose has been taken by accident or with criminal intent, or in *chronic form*, when the patient has become an habitu  .

DIET IN ACUTE OPIUM POISONING.—From the dietetic standpoint, there is not much to say. The stomach must be evacuated as quickly as possible, using the stomach tube when available, and if this is not immediately at hand, a strong emetic such as zinc sulphate or a tablespoonful of strong mustard flour in a cupful of water may be tried. As stimulants, strong green tea or strong coffee may be introduced into the rectum to the extent of half a pint at a time. The treatment of acute opium or morphin poisoning hardly falls within the province of a work dealing with diet, so that the treatment of chronic opium or morphin intoxication will be proceeded with.

DIET IN CHRONIC OPIUM OR MORPHIN POISONING.—Usually, those of European descent who habitually take opium or one of its preparations by the mouth, have begun by taking the drug for the relief of pain. Those who have fallen into the habit of using opium for the pleasure of its effects alone are few in number and generally prefer smoking or the use of the hypodermic needle. As a matter of fact, although morphin addiction is a comparatively recent vice, it has increased in this country almost by leaps and bounds, until at the present time, America holds the unenviable position of standing first among white civilized peoples in regard to morphin addiction.

Morphin Poisoning.—The effects of the habitual use of morphin are far more disastrous and much more marked than those of chronic opium poisoning by the methods just referred to. The morphinist is most difficult to control, and very much more difficult to treat successfully, because the symptoms of mental and physical enfeeblement appear earlier, and speaking generally, run a more rapid course. Morphin is usually taken by means of the hypodermic needle. Although Dr. Alexander Wood of Edinburgh doubtless was possessed of the best intentions and was desirous

of benefiting mankind when he introduced the hypodermic needle, it may be said that his discovery has not been one of unmixed good, for it has placed in the hands of irresponsible persons a ready, handy and easy means of gratifying one of the worst and most degrading vices which has ever afflicted mankind. The symptoms of chronic morphin habit may be briefly summarized as emaciation, anemia, headache, vertigo and wakefulness, tremor, mental disturbance, unconquerable longing for morphin, and if this be denied, the onset of grave symptoms. The effect on the mind is as deplorable as on the body. The subject of chronic morphinism becomes deceitful, crafty, shifty, weak of will power, demoralized, and in most respects but a travesty of his former self. Those who become most readily addicted to morphinism are in the majority of cases neurotics, probably for the most part women.

TREATMENT OF MORPHIN POISONING.—With regard to treatment, two facts stand out. If the treatment is to be effective, very particular attention must be paid to rest and diet. When an individual has become a slave to the habit, the only chance of overcoming the vice consists in treatment under professional control in a sanatorium or hospital. As Blackader says, to break the addiction requires constant medical surveillance, not only on account of the severity of symptoms that may arise, but also in order that the supply of the drug be under the absolute control of the attending physician. This condition cannot be secured in the patient's home, in the midst of his ordinary attendants, whose sympathy he can elicit, or whose aid he can secure by threats and bribes.

Into the question of drug treatment, it will be improper to enter at any length here. It may be stated that with regard to the withdrawal of morphin, opinions vary considerably. Some hold that the withdrawal should be immediate; among these is Clifford Allbutt; others believe that the withdrawal should be gradual. The author is disposed to agree with Blackader, who says that the treatment in all forms of opium addiction consists in a more or less rapid withdrawal of the daily allowance of the drug, the rapidity being dependent on the condition of the patient and the daily amount previously taken.

All who have had experience with this form of drug addiction agree that rest and an appropriate and nutritious diet are prime factors in the restoration of health to mind and body. On this point, Allbutt is especially emphatic. Writing on the subject in his "System of Medicine," he says that whatever the value of auxiliary drugs in the treatment of chronic opium or morphin poisoning, the importance of nourishment is much greater. Without the utmost care and urgency in feeding, the most

promising cases may be disappointing. The dietary must be of the most generous kind, as the stress falls heavily upon the debilitated. The gastric catarrh, perhaps, always present in a greater or less degree, is a serious interference with proper alimentation.

When the nausea and vomiting are troublesome, cold meat jellies, iced coffee with or without cream, iced champagne and the like must be tried by the mouth and supplemented by nutritive enemata. Milk, alkalized with sodium bicarbonate or with lime water, and in some cases, perhaps, peptonized, is, when it can be taken, both nutritious and digestible; it may be supplemented by highly seasoned broths, beef juice, beaten eggs, and coffee and tea with cream. Systematic feeding of moderate amounts at regular intervals gives the best results. If nausea and vomiting set in, bismuth subcarbonate in full doses may be administered; iced broths or meat essences, and coffee without cream may be given in small quantities. As the stomach becomes more capable of work, turtle and other strong soups and similar generous restorative foods must be pressed upon the patient.

Alcoholic remedies must be used sparingly and omitted as soon as possible. As convalescence advances, nutrition very rapidly improves. Rest and diet, therefore, are the sheet anchors in the treatment of chronic opium and morphin intoxication, and no successful issue can be anticipated unless the patient be supported through the withdrawal period by rest, by a carefully arranged but nutritious diet, by massages, and by such other remedies as may be most suitable at the time.

With regard to food, Blackader says: That food is as important as rest in bed. The diet should be highly nutritious and adapted to the individual digestive powers. In most instances, there is impairment of both appetite and digestion, making the feeding as difficult as it is important. In the case of certain patients suffering from cachexia and weakened circulation, if enough nutritious food is not ingested, some form of alcohol may seem advisable. But this must be wisely used, and for a period no longer than conditions demand. There are several special modes of treatment of chronic opium and morphin intoxication which are worthy of mention, but space is lacking to do more than to discuss briefly the dietetic treatment of these special methods.

SPECIAL DIETETIC SYSTEMS.—The first of these is the system originated by Mr. Towns and by means of which, according to Dr. Alexander Lambert, the desire for morphin and other narcotics can be eradicated in less than five days. During the Towns treatment, the patients should be given a regular diet of easily digested food; milk, eggs, cereals, bread

and butter, with tea or coffee, if they desire it. Many have a good appetite throughout. Others in poor physical condition eat sparingly until after the treatment has ended, when their appetite becomes voracious. Lambert utters a caution with regard to overloading the stomach, as an overloaded stomach may give rise to symptoms resembling those experienced during the withdrawal of the drug.

Another mode of treatment is that of Oscar Jennings of Paris, who claims that by the slow plan of withdrawal and the substitution at a certain stage of rectal injections for hypodermic injections, a morphin habitué may be cured without any compulsion and discomfort beyond that which he is willing to submit to and can easily bear. Many and diverse modes have been suggested and practiced in treating chronic morphinists, but there is an absolute unanimity of view that diet is of the very first importance in curing those suffering from this condition.

There is a class of thin neurotics, mainly of the female sex, addicted to morphin, who are extremely difficult to treat from the dietetic standpoint. They are fastidious as to their food in a high degree and it is sometimes almost impossible to induce them to take sufficient food to sustain their bodily powers even at a low ebb. It is the bounden duty of the physician to press nutritious food upon such fastidious patients until a substantial addition to the bodily weight has been secured. Milk, if it can be tolerated, with rest in bed, is the best dietetic treatment.

Once again the author desires to lay stress on the point that in the treatment of opium or morphin addicts, especial attention must be paid to rest and diet and to diet in particular.

Acute and Chronic Iodism.—Acute iodism is seen, for instance, after the injection of large amounts of tincture of iodine into ovarian cysts. Symptoms are: collapse with pallor and cyanosis; rapid and thready pulse, accompanied by vomiting; often marked dyspnea, suppression of urine, albuminuria, sometimes hemoglobinuria; later on, the skin becomes very red. There may also be sore throat, coryza, conjunctivitis, severe frontal headache, and cutaneous eruptions. Chronic iodism may be caused, for example, by long-continued internal administration of potassium iodid, producing coryza, conjunctivitis, sore throat, acne or erythema nodosum, gastric symptoms, vertigo, headache, and other nervous phenomena of a mild character.

DIET IN ACUTE AND CHRONIC IODISM.—In the treatment of acute cases, give white of eggs and stimulants. Other than this, treatment must be symptomatic. In the case of chronic iodism, the system is very considerably run down, and at the same time the digestive powers are weak-

ened, so that in this condition, the diet should be nutritious but easy of digestion. Milk when well borne should form the staple article of the dietary.

Acute and Chronic Lead Poisoning.—Acute lead poisoning produces severe gastro-enteritis. The best antidote is sulphate of sodium or magnesium; or phosphates, white of egg and milk. Chronic lead poisoning is seen in type-setters, type-founders, painters, potters and other tradesmen.

SYMPTOMS OF LEAD POISONING.—General symptoms are lead line on the gums, lead anemia and lead cachexia. Important groups of symptoms are:

1. Lead colic; violent colicky pains, radiating from the umbilicus; usually constipation, exceptionally diarrhea; abdomen concave and hard. Vomiting, hard, slow pulse, high blood pressure, temperature usually normal. The urine sometimes contains a trace of albumin; duration one or two weeks.

2. Profound involvement of the central nervous system. Of all the toxic paralyses, that from lead poisoning is practically the most important. It is a common symptom of chronic lead poisoning and is seen chiefly in those whose occupation leads to a long-continued absorption of small amounts of lead, such as type-setters, type-cutters and type-founders; artists and house painters using lead colors; potters using lead glaze; tinkers, file-cutters, etc.

Lead paralysis, *wrist drop*, may occur as the only symptom of chronic lead poisoning, or it may be associated with other symptoms. Under the head of plumbism or saturnism, profoundly affecting the central nervous system, may be included saturnine encephalopathy, sudden development of grave cerebral symptoms, convulsions, coma, delirium, great mental uneasiness and excruciating headache, *Saturnine amaurosis*.

3. The neuro-muscular form most frequently attacks the knee, but is also seen in the joints of the upper extremities. Sometimes it is associated with painful muscular contractions. It should also be borne in mind that chronic lead poisoning may give rise to gout and chronic interstitial nephritis.

4. In this class are included all those cases of chronic plumbism characterized by profound cachexia, early decrepitude and albuminuria. Pallor is a conspicuous feature. One of the gravest effects of lead upon the nervous system is neuro-retinitis.

There exists not only an individual idiosyncrasy, but there is an hereditary disposition to constant lead poisoning, and to this may be added a sex idiosyncrasy, women, particularly young women, being more easily

affected by lead than men. Lead poisoning has been known almost from time immemorial. Industrial lead poisoning annually claims many victims, and the white lead factories supply the largest number of cases of plumbism. Lead gains access to the system by the skin, the respiratory passages and the intestinal tract. It is with plumbism as with intoxication in general; certain circumstances intensify the predisposition—the younger the individual, the greater the liability, and particularly is this the case with women. Young women who are anemic and ill-nourished are rapidly brought under the influence of the metal, and in them the nervous system is especially liable to suffer.

Lead poisoning in a pregnant woman results in fetal death, and in death of offspring soon after birth, not only when the mother is the victim of the poisoning, but also when the mother is normal but the father "lead." As far as maternal lead poisoning is concerned, there seems to be abundant evidence that women who work in lead are far more likely to abort than are women in ordinary factory work.

Tardieu(3) reported to the French government in 1905 that 608 out of 1,000 pregnancies in lead workers resulted in abortion. Animal experiments also carried on by Oliver(4), by Gilbert, and by Legge(5) and Goadby, show that death of the fetus may be produced by poisoning the mother with lead.

In those countries in which many women are employed in the lead industries, these facts are of great importance and have resulted in laws forbidding the employment of female labor in certain processes. In the United States, few women employees are exposed to lead poisoning, and we are more vitally interested in the question whether or not paternal plumbism has any effect on the germ.

DIET IN CHRONIC LEAD POISONING.—Treatment is both preventive and curative. Acidulated drinks composed of water in which sulphuric acid and magnesium sulphate are dissolved and to which lemon juice has been added, are provided in all white lead factories and the operatives are encouraged to drink freely of them. The alcoholic habit strongly predisposes to plumbism, so that in order to avoid lead poisoning, alcohol should be entirely banned. Milk should form a large part of the dietary of people working in lead factories, and no person should be allowed to work in a white lead factory before breakfast, for clinical experience and experiments have demonstrated that the presence of food in the stomach diminishes the solvent influence of the gastric juice upon lead. For the treatment of lead colic, if pain be severe, use opium and hot compresses. Warm baths are beneficial. Constipation is treated by enemata and gentle

laxatives. The successful treatment of lead poisoning is preventive rather than curative or remedial, and in its prevention diet plays a part.

Nicotin Poisoning.—In the chronic form of nicotin poisoning the most prominent symptoms are palpitation, irregular heart action, paroxysms of asthma and angina pectoris; tremor, muscular weakness, loss of sleep, amblyopia, scintillating scotoma, gastric disturbances and chronic catarrh of the pharynx and larynx. Excessive tobacco smoking is a fruitful cause of gastro-intestinal disorders, and of course diet plays a part in the treatment of such affections. In acute cases, heart stimulants are sometimes indicated, while chronic poisoning necessitates the giving up of tobacco. Further treatment is symptomatic.

DIET IN NICOTIN POISONING.—The selection of a dietary must be guided by the condition of the alimentary tract. The diet recommended for gastro-intestinal disorders will, in the majority of cases, be appropriate in the treatment of the gastro-intestinal troubles brought on by excessive use of tobacco.

Mercurial Poisoning.—Workers in mercury become poisoned by direct handling of the metal, by absorption through the skin, or by breathing it in the form of vapor or dust, as seen in the makers of thermometers, scientific instruments and mirrors. According to Strümpell, it is rarely occasioned by the prolonged use of antisyphilitic remedies. The symptoms are anemia, emaciation, with great muscular weakness, and gastro-intestinal disturbance. Among the chief effects of acute mercurial poisoning are gingivitis and profuse pytalism—"salivation." In the therapeutic use of mercury, besides the rarer mercurial enteritis, mercurial stomatitis is the most important toxic symptom, in the form of foul-smelling necrosis of the mucous membrane, with ulceration of the mucous membrane of the cheek, jaws, gums, etc. The diet should be liquid, such as milk and soups, or gruels.

CHRONIC MERCURIAL POISONING.—Tremor is very common in chronic mercurial poisoning and is of special interest. The tremor is a pronounced intention tremor, that is, it is usually not present when the body is kept quiet, but it comes on with all movements, like the tremor in multiple sclerosis. Pytalism is relieved by mouth washes of myrrh and potassium chlorate, with tonics internally. In the slow forms of mercurial poisoning, the symptoms must be dealt with on general principles, the nutrition of the system must be carefully attended to.

The food of these patients must be nourishing and easy of digestion, and milk in its various forms is, as a rule, the sheet anchor in the diet of chronic mercurial poisoning.

Phosphorus Poisoning.—Poisoning by phosphorus is either acute or chronic; the latter being invariably of industrial origin. The invention of the match in 1833 rendered possible poisoning by phosphorus on a large scale. This invention also brought into notice the possibilities of phosphorus as a comparatively easy means of committing suicide; the consequence was that suicide by phosphorus became frequent, especially in Germany and France. However, it was, and is still to a large extent, in the manufacture of matches that the majority of the fatalities and injuries from phosphorus occur.

When the heads of the matches were composed of yellow phosphorus, those engaged in the manufacture of such matches were exposed to great risks, in fact were certain to suffer more or less as a result of this occupation. This yellow phosphorus is not only poisonous when taken internally in a state of fine division, but its fumes during the process of manufacture of matches are very apt to produce necrosis of the jaw, known as "phossy jaw." During the past few years legislation has been enacted in Europe forbidding the use of yellow phosphorus in matches. In America, the common yellow phosphorus match is still largely employed, except in the so-called safety match.

Chronic phosphorus poisoning, then, is confined to "match factories" as a result of inhaling the fumes of phosphorus; the most dangerous portions of the factories are the rooms in which the phosphorus composition is mixed, and those in which the cutting and dipping are done. Public opinion everywhere has been so greatly aroused by the scandalous conditions of some match factories, even those in which the yellow phosphorus is still used, that the proprietors have been compelled to introduce measures to safeguard the health of the employees as far as is possible; therefore, as a rule, the health of the operatives is not seriously affected. As Blackader points out, in factories in which ventilation is defective, the fumes of the phosphorus are more liable to be absorbed, and can be recognized by the garlicky odor of the breath.

Good hygienic measures rigidly carried out are the main preventives of phosphorus poisoning. Especially should the state of the teeth of operatives in match factories be carefully supervised, and no person should be permitted to start work in such a factory without a certificate from a reliable dentist that his teeth are free from caries. Also he or she should have a certificate of good health from a physician.

DIET IN PHOSPHORUS POISONING.—Diet plays a part in the prevention and treatment of this condition, inasmuch as a person well nourished is less likely to be seriously affected than an ill-nourished individual.

Food is a factor in the treatment, because when the system is devitalized as in phosphorus poisoning, a nourishing diet is an aid to recovery of health.

According to Blackader, "On the earliest indication of inflammation in or around the root of the teeth, treatment should at once be commenced. All work in an exposed atmosphere must stop. The general health should receive prompt attention. Fresh air, a generous dietary, outdoor exercise in the sunshine, should, if possible, be secured. The local trouble should be treated, at first with antiseptics, but if suppuration ensues, free incision and thorough drainage should be tried for a short time. If the symptoms do not improve, resection is the only recourse, but to secure the best results, the general health should be in a fair condition before the operation is attempted."

Magitot of Paris advises that the treatment of phosphorism and its cachexia should be directed towards the elimination of the poison, and with this end in view, he recommends an exclusive milk diet, the inhalation of oxygen, gentle exercise, and repeated small doses of turpentine.

Tin Poisoning.—Tin poisoning, it has been claimed, may occur from the prolonged use of preserved meats, vegetables or fruits put up in tins. Quoting from Dr. von Hamel Roos(6), Gilman Thompson says that of late years attention has been directed to this subject by chemists, and a number of cases of serious metallic poisoning are reported from time to time. As a general rule, if the canning is properly conducted and the meats and vegetables have not undergone decomposition, there is no danger in their use, provided they are thoroughly cooked and provided also that the cans have not been kept too long. The quantity of tin dissolved and the age of the canned material are in direct proportion. Food that has been canned for several years is very apt to poison the individual who ingests it.

At the Congress of German Physicians in Heidelberg, September 25, 1889, Professor Beckurts reported that the action of vegetable albuminoids or of meat albumin on the can results in the formation of sulphate of tin. This is apt to occur in canned asparagus. Two cases of severe poisoning from this source have recently come under Thompson's observation. Severe vomiting and diarrhea associated with faintness and vertigo occurred. This illness followed within several hours after the ingestion of canned asparagus that had been kept for a long period.

Dr. Roos, referred to above, advises that tin cans used for the preservation of foodstuffs, and especially of vegetables, should be coated on the inside with insoluble varnish, for the purpose of preventing contact be-

tween the albuminoids or vegetable acids and the tinned surface by means of which the metal is dissolved. Dr. Roos, after opening a can of asparagus that had been put away for thirty-one years, discovered that the coating of tin on the inside was entirely dissolved in the liquid. A can of beef weighing 976 grams and kept for eight years contained 77 milligrams of oxid of tin, while in a can of asparagus prepared only four months before were 11 milligrams of oxid of tin and, in addition, 6 milligrams of copper. A variety of preserved foods, such as apricots, apples, corn, soups and meat have all been discovered to have a similar action upon tin, gradually dissolving this metal. By coating the tinned surface with varnish, this solvent action has been almost wholly prevented.

"Tin sickness," according to the Amsterdam correspondence of the London Exchange Telegraph, is a remarkable disease observed in many parts of Germany, especially in Berlin, Munich and Cologne, caused by the continued use of foods preserved in tins. This so-called tin sickness is considered a form of blood poisoning. Thousands of cases are reported in every large city, although the authorities exercise strict supervision over the tin used for canning foods. There appears to be more probability that the malady is a deficiency disease, as canned foods of every nature are known to be notably lacking in vitamins.

Zinc Poisoning.—This industrial form of poisoning, which, when acute, presents symptoms of severe gastro-enteritis, especially vomiting. Chronic poisoning from zinc fumes is characterized by fever, distress, vertigo, vomiting, metallic taste, general anemia, and emaciation.

DIET IN ZINC POISONING.—As in other forms of metallic poisoning, the object of treatment from the dietetic standpoint is to build up the system by nutritious and easily digested food. Milk, when well borne, should form the staple of the diet.

REFERENCES

1. ROLLESTON, H. D. Sutherland's System of Dietetics.
2. BLACKADER, A. D. Forchheimer's Therapeutics of Internal Diseases, pub. by D. Appleton & Co.
3. TARDIEU. Poisons industriels, Paris, 1905.
4. OLIVER. Brit. Med. J., 1911, vol. i, 1906.
5. LEGGE. J. Hyg., 1901, i, p. 96.
6. ROOS, VON HAMEL. Rev. internat. d. falsific., 4, 10, 179.

CHAPTER XVII

DIET IN DEFICIENCY DISEASES

CASIMIR FUNK, SC.D., PH.D.

General Considerations: Common Characteristics of Deficiency Diseases.

Diet in Deficiency Diseases: Beriberi; Scurvy; Pellagra; Rickets.

GENERAL CONSIDERATIONS

Of the known or supposed deficiency diseases, four, namely: beriberi, scurvy, pellagra and rickets, will receive special attention in this chapter. It is the first time since the publication of my book on vitamins, that I have been called upon to write a monograph on this subject in a medical work, in one and the same chapter. This fact is very significant and proves that the views which I have endeavored to advocate for a number of years, are beginning to filter slowly through the minds of physicians and scientific men. Up to the present time even the most modern text-books have classified the above-mentioned diseases in different chapters. For instance, beriberi and pellagra either amongst tropical diseases or diseases of unknown etiology, scurvy amongst the diseases of the vascular system, and they were usually quite at a loss as to the classification of rickets.

That these four diseases are being discussed in one chapter must not be interpreted so as to lead to the conclusion that their position as deficiency diseases has been universally accepted by the medical world. Beriberi and scurvy are, as a matter of fact, with the exception of very few authorities, accepted as deficiency diseases, whereas in the case of pellagra and rickets, further research is required before their final position can be absolutely decided(1).

Common Characteristics of Deficiency Diseases.—The deficiency diseases or avitaminoses to which besides the four mentioned above, conditions like osteomalacia, sprue in men and others found only in domestic animals, may be added, have one cause in common, namely, a partial or an absolute

deficiency of vitamins in the diet. The vitamins to which reference is made are fully described by Dr. Macallum in Volume II, Chapter VIII, and, therefore, I shall limit myself to a consideration of a few facts which are necessary for a complete understanding of the aforementioned diseases.

The presence of these substances in various foodstuffs was for the first time clearly demonstrated by the present writer and the term vitamins applied to them, expressing their importance for the continuance of healthy life and also the fact that they represent a class of organic nitrogenous bases of complicated structure. Their final identification met with great experimental difficulties as products present only in small quantities in nature were being dealt with. They are highly unstable and are apparently transformed on purification into more stable substances, losing at the same time a part or the whole of their physiological activity. This inactivation occurs especially when food is subjected to too prolonged heating or sterilization as happens in preparation of canned foods and also in the pasteurization or sterilization of milk for babies.

These properties of vitamins sufficiently explain the conditions under which deficiency diseases are liable to occur in human beings. Another etiological factor has been found in the use of flour which has been deprived of vitamins by too extensive and fine milling(2). In our climate, besides the conditions found in children fed on overheated milk, with addition of an unproportionately large amount of patent flour preparations, sporadic cases of deficiency diseases are in all probability more frequent than is generally supposed, and a wider knowledge of vitamins on the part of medical practitioners will assist their better recognition than is the case at present.

VITAMINES.—Although I do not wish to encroach upon Dr. Macallum's part of the subject, the discussion of the vitamins, yet I think it will be fitting to explain at some length my views on the vitamins as a new factor in nutrition. With this object before me, I will give the gist of a paper read by me at a meeting of the New York Academy of Medicine, held on April 20, 1916(3). I said in this paper that recently sufficient evidence has accumulated to warrant the statement that besides the ordinary food constituents, such as proteins, fats, carbohydrates, lipoids and other inorganic salts, to the presence of which, with the exception of salts, the caloric value of food is due, a number of substances can be found in very small quantities which are as indispensable to life as the former constituents. These substances are elaborated in both the higher and lower plants, but cannot be synthesized by the animal organism, and this

is one of the reasons why animal life depends on plants. These products are present in all food, in all organs and in all vital parts of the plant without a single exception. Their presence has been revealed by the modern technic of cooking and by the refinement of food due to the introduction of machinery for the industrial preparation of foodstuffs on a large scale. The insufficiency of these substances has been noted in cases of mental disturbance in which a particular food was fancied to the exclusion of others.

Without going into the detail of the extraction and preparation of these substances, it may be stated that they concern products showing a good deal of instability under ordinary laboratory conditions. It would take a very long time to ascertain accurately the constitution and composition of the vitamins, since the difficulties of the first stage, their isolation in a chemically pure state, have not yet been overcome, and this has limited to some extent the value of the investigations with reference to the second stage. However, sufficient evidence has been gathered to warrant the designation of "vitamins" to be applied to the substances and the diseases which arise from their lack or insufficiency as deficiency diseases or "avitaminoses."

ACTION OF THE VITAMINS.—With reference to the action of the vitamins nothing very definite is known except that they bear a certain relationship to the carbohydrate metabolism. A fact which has been established in connection with metabolism in deficiency diseases is that in the absence of vitamins, not only negative balance of nitrogen was shown, but the whole metabolism went wrong. I have shown that no animal has as yet been found able to live for more than a short time on a vitamin-free food, and that an artificial diet composed of casein, starch, fat, sugar and all the necessary salts will produce a deficiency disease of some kind according to the animal chosen, provided that sufficient care is taken to purify the ingredients. To this diet all known lipoids, cholesterol, various proteins, and all sorts of salts could be added, but nothing except the addition of vitamin could save the animal from certain death.¹

Large epidemics, as they break out in time of war amongst the half starved population, and also in normal times when the crops are insufficient, present no difficulties for diagnosis. Different in this respect are the isolated cases, and first of all the question arises as to the best modern

¹ The preparation from yeast and certain foodstuffs of the substance, the deficiency of which in diet occasions polyneuritis in birds.—*Jour. Physiology*, 1912, xlv, 75.

methods of diagnosis. Furthermore, a careful inquiry should be made into the nature of the diet preceding the outbreak of the disease, although little stress can be laid upon the assertion of the patient that he partook of a normal varied diet. In this connection, details which at first sight seem trifles should be taken into account, namely the way in which the food has been prepared, the time of cooking, and finally the most important factor, the ratio between the amount of vitamins present in the diet, in the form of milk, eggs, meat, beans and so on, and the amount of vitamin-free starchy food consumed. This latter factor, as we shall see later, is of the utmost practical importance. The ultimate diagnosis can be made by an administration of vitamins, either in the form of milk, eggs, vegetables and fruits, or in the form of yeast. If the condition in question is a real avitaminosis, a great improvement in the condition of the patient will be noted within a few days, for in such a case the vitamins act very quickly. It seems, therefore, that the use of vitamins is the best differential means of diagnosing deficiency diseases.

All deficiency diseases have several characteristics in common. As the deficiency of vitamins appears to affect the peripheral and the central nervous system, this is possibly the primary condition responsible for the whole sequel of other symptoms(4). The pathological changes in the nervous system present the histological picture of a pronounced fatty degeneration of the nerve fibers. These changes have not yet been investigated by physiologists, and we do not know the links which bind the primary cause to a great number of possibly secondary symptoms. The most important amongst these are the skin lesions, heart lesions, and disturbances of the intestinal tract, all of which can be, perhaps, regarded as trophic changes. We know very little of the physiological functions of vitamins, except that they seem to have a definite relationship to carbohydrate metabolism. In numerous animal experiments with a vitamin-free food and also in a few instances in human cases, a distinct rise in blood-sugar was found which disappeared after the administration of vitamin. Besides it was found that the time necessary for the production of a deficiency disease is in inverse proportion to the amount of carbohydrates fed. Vitamins have also a distinct action on appetite and on the whole metabolism. On a vitamin-free food, we find a negative balance of all the food constituents including the inorganic salts. The balance can be switched off to a positive one by an addition of vitamin without the rest of the dietary being altered.

On feeding with a vitamin-free food during the first few weeks, no discomfort is experienced. After six to twelve weeks, depending on the

amount of vitamine supply in the food (which can hardly be entirely eliminated, as all our foods contain traces of vitamine), symptoms appear, become more intense, and finally lead to a fatal issue. Up to the present time, no animals have been found which are able to live on vitamine-free food for any length of time, and there seems to be no exception to this rule. On an avitamine diet, the resistance to infectious diseases is apparently diminished, which observation may have a bearing in tuberculosis.

DIET IN DEFICIENCY DISEASES

Beriberi.—Beriberi is a disease which breaks out in countries where rice is used as the chief ingredient of the dietary, although we have known for some years that almost every diet can lead to beriberi when the vitamins in it are destroyed by too prolonged cooking or eliminated in some other way. The disease exists in several distinct types, of which the atrophic type, the wet edematous (which is called also Epidemic Dropsy in India) and the paralytic type are the most common. In the first stage of the disease, the patients complain of pains and numbness in the lower limbs, and in later stages edemas and contractions of muscles develop, which hinder the patients in walking. Not infrequently gastro-intestinal troubles are associated with these symptoms and often also heart symptoms, like tachycardia or dyspnea. The intestinal toxemia which sometimes develops is a complication of the beriberi picture which also disappears after vitamine therapy.

The etiology of beriberi is one of the most fascinating problems in medicine. My work(5) and that of Fraser(6) and Stanton(7), Eykman, Cooper(8) and others(9) have established definitely the fact that beriberi is essentially a deficiency disease.

DIET IN BERIBERI.—The therapy of beriberi consists first of all in cutting off completely the diet responsible for the disease and in making a change to a diet rich in vitamins and poor in starchy products. The vitamine for preventing beriberi or polyneuritis in animals, differs from that which prevents scurvy. The anti-beriberi vitamine is a nitrogenous substance, not a protein, and does not contain phosphorus.

The causation of beriberi has long been associated with rice and this relationship has now been proved beyond a doubt. The rice grain is surrounded by a husk or pericarp, beneath which is the subpericarpial layer containing the anti-beriberi vitamine. Highly polished rice is devoid of the pericarp, subpericarpial layer and germ, these layers having been completely removed in the modern process of machine polishing. If

human beings are fed on such rice as the sole or main article of diet and if the diet is not supplemented by substances containing the anti-beriberi vitamins, beriberi will be developed. It is stated that rice from which the husk has been removed by steaming or by parboiling will not cause beriberi, for the reason that this process leaves enough of the subpericarpial layer to furnish sufficient amounts of anti-beriberi vitamin to ward off the disease. The cure can be accelerated by the administration of yeast or rice-polishings, extracts or isolated vitamins, either per os or subcutaneously.

The katjang idjoe bean contains a proportion of anti-beriberi vitamin, but yeast is a substance particularly rich in anti-beriberi vitamin. The yolk of egg, brain, liver, kidneys, sweetbreads, oatmeal, haricot beans, and peas, all contain this vitamin to a greater or less extent. The following table, by Voegtlin, shows the vitamin content of foods:

TABLE ILLUSTRATING THE VITAMINE CONTENT OF FOODS

ANTI-NEURITIC PROPERTIES		ANTI-SCORBUTIC PROPERTIES	
Relatively Rich	Relatively Poor	Relatively Rich	Relatively Poor
Brewer's yeast	Sterilized milk	Fresh vegetables	Dried vegetables
Egg yolk	Sterilized meat	Fresh fruits	Dried fruits
Ox heart	Cabbage	Raw milk	Sterilized milk
Milk	Turnips	Raw meat	Canned meat
Beef and other fresh meat	Carrots and other vegetables of this type		Dried cereals
Fish; Beans; Peas	Highly milled cereals		Pork fat
Oats; Barley; Wheat	Starch; Pork		
Corn			

According to Dr. William H. Wilcox, with whose views I am in agreement, the diet in acute cases of beriberi in which gastric symptoms are marked should necessarily be light and mainly liquid. Yeast should be given. If autolyzed yeast is given, about half a pint should be administered daily. It may be sweetened with sugar and flavored with lemon rind or essence of lemon. If given in the form of dried yeast, boiling milk should be poured on the yeast, stirred up into a thin cream, and more warm milk and sugar added. Sometimes cakes of yeast are made mixed with starch; as a rule, each of these cakes weighs about $\frac{1}{2}$ ounce. Six of these may be given daily. The following has been found a convenient and palatable method of preparing yeast cakes for beriberi patients. One or

two yeast cakes are placed in a basin, boiling milk is poured on them, and the cakes broken up and rubbed round with a spoon into a thin cream. Warm milk and sugar are then added.

Pea soup, because it contains anti-beriberi vitamins is also a valuable article of diet. The yolk of egg contains a good deal of anti-beriberi vitamin, and accordingly three or four raw eggs should be given daily, beaten up with milk, or in any way acceptable to the patient.

When the patient can take solid food, in addition to the yeast, which is very essential throughout the disease, the following articles of diet may be given. They are arranged in order of their value in regard to the quantity of essential vitamin present, those highest in the list being rich in vitamin.

ARTICLES OF DIET FOR BERIBERI CASES, ARRANGED IN ORDER AS REGARDS THEIR VITAMINE VALUE

- | | |
|--|---|
| 1. Yeast (already mentioned) | 9. Haricot beans |
| 2. Eggs (either raw or lightly cooked) | 10. Katjang idjoe beans |
| 3. Brain | 11. Lentils |
| 4. Liver | 12. Porridge |
| 5. Sweetbreads | 13. Brown bread |
| 6. Kidneys | 14. Milk (fresh if possible) |
| 7. Heart muscle | 15. Fish or meat |
| 8. Peas | 16. Ordinary bread or biscuits (whole kernel) |

When there is no gastric disturbance, beriberi patients should have fresh vegetables, fruit, and, speaking generally, an ample dietary. The speed with which the cure is effected depends entirely on the amount of pathological changes present. In long standing cases, it may be too late to start a vitamin therapy, the changes in the nervous system being too advanced to be corrected. This phenomenon can be studied in an exact experimental manner in birds (pigeons and fowls), which on a polished rice diet develop a disease apparently identical with the condition in the human. Microscopical examination of a nerve from a bird having beriberi shows a certain proportion of the nerve fibers in a state of fatty degeneration (10). When vitamin is administered, even parenterally, the intestinal trouble (diarrhea) disappears and the animal from a dying condition can be brought to a normal state within a few hours; in spite of the fact that the nerve fibers still remain degenerated. Not all animals develop beriberi on polished rice or white bread, birds and man being most susceptible, whereas other animals under similar conditions develop a disease resembling scurvy.

It may be pointed out that beriberi develops also in breast fed children and this notwithstanding the fact that the mother may or may not show manifest symptoms of the disease. The necessity for vitamins in pregnancy and lactation seems to be a particularly acute one, and special care must be taken to provide the mother with a suitable diet containing a sufficient amount of vitamins. A condition in children called by German authors "Mehlnährschaden," that is, a starch toxemia, is possibly nothing else but infantile beriberi.¹

The elucidation of the etiology of beriberi is one of the greatest successes of modern preventive medicine. By suitable legislation, which has been already partially introduced into several countries, and by which a too extensive milling of the cereal grains will be prohibited (which is, of course, only important for countries which consume chiefly such one-sided diets) and also by enlightening the population as to the danger of a diet containing a too large percentage of starch, the disease can be entirely eradicated.

RELATION OF VITAMINES TO BERIBERI.—It is now generally conceded that beriberi is due, primarily, to a deficiency of a certain chemical substance (vitamine) in the dietary, and secondarily, to faulty metabolism. It has been proven beyond question that certain foodstuffs are either relatively or absolutely deficient in the beriberi-preventing vitamine, while other foods contain a plentiful supply.

If a group of individuals are compelled to subsist upon a dietary wholly deficient in beriberi-preventing vitamine, they will surely develop the disease. All clinical evidence concerning beriberi at the present time points out the fact that a poorly balanced one-sided dietary greatly increases the danger of the development of beriberi.

No matter how well proportioned the ternary food elements may be, nor how high the caloric value of the ration as a whole, unless the foods collectively contain the requisite vitamine content, beriberi will develop.

The practicing physician should know which foods contain the beriberi-preventing vitamine, in order to correct this deficiency. The rôle played in the causation of beriberi by over-milled polished rice, over-milled corn meal or other cereals denuded of their aleurone layer, is too well known at the present day to merit more than passing mention. Students of deficiency diseases are well acquainted with the fact that the great endemic centers where beriberi is most prevalent, are always con-

¹ The cure of infantile beriberi by the administration to the infant of an extract of rice polishings, Bull. Manila Med. Soc., 1912, vol. iv, p. 26.

finned to people who use polished rice as the staple article of diet, which is sufficient commentary on the part played by rice in the causation of beriberi.

Vedder has lately contributed an instructive paper on the known and unknown about beriberi, in which he says:

It does not appear to be so generally known that various carbohydrate foods, such as tapioca, sago, and the various starches and sugars, are quite as deficient in vitamins as rice, and will produce beriberi in man or animals with great certainty when used too exclusively as articles of diet. It is even more important to note that ordinary white wheat flour is also very deficient in vitamins. Little was perhaps the first to report the occurrence of beriberi among men living almost exclusively on fine wheat flour, but the literature is full of outbreaks of what was evidently beriberi in jails, asylums and other institutions where bread has been used as the main staple of diet. One of the latest instances of this kind was reported by Parker from a jail at Elizabeth, N. J. It has also been shown that fowls fed upon a combination of rice and bread, or upon bread alone, develop polyneuritis quite as promptly as when fed exclusively upon rice.

All food products made of white wheat flour must be regarded as deficient in beriberi vitamins and as beriberi producers. Macaroni falls into this category. It produces polyneuritis in fowls, and on at least one occasion a sanitary officer endeavored to prevent the occurrence of beriberi by substituting macaroni for the rice previously used. Quite as much beriberi occurred after this change as before, and in this particular case, instead of concluding that both foods were deficient, the erroneous deduction was made that the disease was not of dietary origin.

It should also be noted that all canned foods must be regarded as possible beriberi producers. It has been shown by numerous investigators, including the writer, that heating to 120° C. destroys the beriberi-preventing vitamins in certain foods. All protein foods that are canned must be subjected to about this amount of heat in order to kill all the putrefactive organisms, and such canned foods are undoubtedly beriberi-producers when used in excess. I have seen at least one case of undoubted beriberi in a white man, a ship's officer, who had eaten a most varied and satisfactory diet, except that for the previous four months everything he had eaten had been canned.

Scurvy.—Scurvy is not a common disease and its cause is closely associated with a continuous consumption of dried foods in the form of canned goods, with lack of fruits and fresh vegetables. Such food conditions prevail in Arctic expeditions and some years ago were prevalent on sailing vessels which remained at sea for a number of weeks (ship-beriberi) without touching a port. Large epidemics of scurvy occur also in besieged cities, and in times of famine when the crops, notably potato crops, are not sufficiently ample and varied. In children the disease develops when their milk has been subjected to pasteurization either at a too high temperature or for a too long period of time.

VITAMINES IN RELATION TO SCURVY.—In fact, my opinion is, and there is strong evidence in support of this belief, that scurvy in young children is due to the absence of vitamins in the milk upon which they are fed. I have proved and other workers in the same field have shown, that milk contains a considerable amount of these vital substances. Vitamins, in a general way, are very sensitive to heat. They are partially destroyed by heating milk for a short time and wholly destroyed by boiling or heating milk for a protracted period.

The prevalence of scurvy among babies fed artificially on milk, is relative. It varies in proportion to the degree of heating to which the milk is subjected. Infants fed on good milk properly pasteurized are much less liable to scurvy than those fed on boiled or sterilized milk. However, like beriberi, scurvy may develop in breast fed children or in children fed on raw cow's milk. In the case of scurvy occurring in children fed on cow's milk, the disease is due to the deficiency of the milk in vitamins, and the amount of vitamins in the cow's milk varies with the amount of vitamins in her food. The milk of cows contains less vitamins in winter, when they are eating dry food, than in summer, when they are eating green food. The occurrence of scurvy in infants at the breast may be explained in the same way.

Furthermore, and this is an important point, the vitamins are diminished in the milk of women who are underfed.

Pasteurization, boiling or sterilization of milk would, therefore, seem to be contra-indicated in providing a food suitable and adequate for the proper nourishment of young children. However, the fact that pasteurization when properly performed, while it only partially destroys the vitamins, to some extent provides a safeguard against infectious diseases, supplies a good reason for the continuance of pasteurization. When it is also taken into consideration that vitamins can be very easily added to milk in an independent form, in orange juice or grape juice, or autolyzed yeast, for instance, it must be admitted that their destruction or possible destruction by heat affords no valid argument against pasteurization, at any rate, and perhaps no argument against sterilization or even against desiccation of milk if it can be shown that such processes confer other and important advantages, and provided that vitamins in any form are added to these products.

As a result of the educational propaganda that heating of milk destroys a part of the vitamins, the addition of orange or orange-peel juice has been universally accepted. If this precaution is taken, infantile scurvy will disappear. The vitamin which prevents scurvy is very much

less stable than the vitamine which prevents beriberi, and is present in fresh fruits, vegetables, and also in milk. It seems to be particularly stable in foodstuffs like orange or lime juice, in which a large quantity of organic acid (citric acid) is present in a free form. Some of the vegetables lose their antiscorbutic properties on drying at ordinary temperature. The vitamine which prevents beriberi seems to be without effect on scurvy.

Scurvy is a disease very similar to beriberi, although the changes in the nervous system are not so pronounced but are substituted by changes in the vascular system, petechiæ, subcutaneous hemorrhages in the region of the thigh and in the gums, hemorrhages in the periosteum of bones and often enlargement of the right heart. The literature dealing with the subject contains data on intermediary forms between beriberi and scurvy and even pellagra.

The disease can be experimentally produced and studied in practically all mammals. Monkeys seem to be particularly valuable for the investigation of the disease, young monkeys developing on heated milk a condition closely resembling infantile scurvy.

Scurvy can be very quickly cured by an addition of anti-scurvy vitamins and can be entirely prevented by a mixed well-balanced diet.

Pellagra.—The position of pellagra as a deficiency disease is not as yet definitely accepted, although there seems to be very little doubt as to the results of modern investigations on its etiology. The elucidation of its origin will have far more practical value than the solution of the beriberi and scurvy problems, as the disease is more widely spread and in certain countries constitutes a standing menace to the population. Pellagra is a disease which occurs exclusively in those regions in which corn or corn products are consumed in large quantities, and is geographically limited to the zone of corn plantations, disappearing in those districts in which potato plantations have been introduced. This, of course, does not mean that corn itself is responsible as the cause of the disease. It is perfectly plausible, and in accord with the vitamine theory of its causation, that pellagra may occur where no corn is consumed, but where a vitamine deficiency exists, and where the diet resembles that of the corn countries in its lack of vitamins. Pellagra very closely resembles beriberi and scurvy, differing in that the intestinal disturbance is more pronounced and that trophic changes occur in the skin exposed to the sun rays; mental disturbance is often in evidence. Pellagra also occurs in breast fed babies, thus showing a perfect analogy with infantile beriberi and scurvy.

The entire elucidation of the pellagra problem has been considerably delayed owing to the fact that the study of the disease had to be confined to human cases, no animal having been found which develops a disease similar to pellagra. Since the vitamine theory of the origin of pellagra was expressed a few years ago by the writer of this chapter, remarkable progress has been made with regard to researches in this direction. It was then suggested that the extensive and fine milling of corn might be partially responsible for the etiology of this disease and might also be responsible for the fact that with the introduction of complicated mechanical devices for the milling of corn in substitution of the old domestic ways for eliminating the husk, the disease became more prevalent and more acute. Modern methods of milling eliminate the husk entirely. Goldberger(11) was able to produce in inmates of a prison a condition which in the light of our modern knowledge must be regarded as pellagra; he cured the condition by an administration of a diet rich in vitamins in the form of eggs, meat and milk. As pointed out by Voegtlin, the use of bicarbonate of soda in the process of baking corn bread, may also be partially responsible for the etiology of the disease, as vitamins are readily destroyed by alkalies. (*See* Volume II, Chapter VIII, page 236.)

DIET IN PELLAGRA.—It is obvious from what we have said, that pellagra can be prevented by the education of the population and by a suitable and adequate legislation, as the result of which the extensive and fine milling of corn will be prohibited. People should be encouraged to plant potatoes, as pellagra does not occur in those districts in which potatoes grow. The experiments of Hindhede, which showed that persons lived in excellent health on an exclusive diet of potatoes for over a year without the slightest sign of a deficiency disease, is strong evidence in support of this view. The amount of corn products—in form of highly milled meal—should not exceed a certain proportion of the entire dietary, and the consumption of potatoes, meat, eggs, milk, vegetables and fruits should be encouraged. It seems not improbable that pellagra is nothing more nor less than a chronic mixed form of beriberi and scurvy. This would mean that pellagra is to be interpreted as the result of long continued partial vitamine-starvation, and would also explain why we are able to produce beriberi and scurvy, but not pellagra, in animals.

Rickets.—The position of rickets as a deficiency disease is still less generally accepted than that of either of the above mentioned diseases. The disease is rare but occasionally met with in breast fed children; it occurs mostly in the second half of the first year of life, when milk is being supplemented with cereals and patent food preparations. Rickets

seems to be very rare amongst the young of the rural population where mixed diet is started early.

VITAMINES IN RELATION TO RICKETS.—In contra-distinction to beriberi, scurvy and pellagra, rickets is not a fatal disease. It is, therefore, correct to assume that this condition is due to a partial deficiency of vitamins or to a deficiency of one particular vitamin which, although not essential to life, has as its particular function, the regulation of the metabolism of inorganic salts, especially of calcium and magnesium, which are essential constituents of bones. The disease usually commences in the following way—the child suffers from night sweats of the scalp, the fontanelles remain open, and the ossification of the bones is greatly inhibited. They remain soft and flexible to such an extent that permanent deformities may follow. Rickets is often associated with severe anemia, and the whole system of nutrition is out of order. The epiphyses of the bones are enlarged and on microscopic examination show an impaired ossification process. When a child with florid rickets is put into a metabolism bed and the entire nutrition studied, we find a negative balance of calcium and magnesium which seems to be at present the best criterion for the diagnosis.

The disease resembles pathologically a condition known as osteoporosis, which is due to lack of calcium and magnesium salts in the food. Chiefly for this reason rickets has been attributed to lack of calcium in milk. This hypothesis must, however, be rejected, as normal milk is certainly not deficient in calcium but contains as much as necessary for the organism. In this connection, we must take into account the fact that a child as compared with other mammals grows relatively slowly and that the calcium supply can be distributed over long periods. The true cause of rickets is apparently the impaired resorption power of the organism towards calcium derived from milk. Some analogy exists with the condition found by metabolic experiments in beriberi and scurvy, where the deficiency of vitamins produces a negative balance of the inorganic constituents.

The investigation of rickets is somewhat complicated by the fact that in studying a case with external signs of rickets, we never know if the patient is, physiologically speaking, cured, or if the case is one of active rickets.

From the point of view of the vitamin deficiency theory of rickets, there are no theoretical objections to the occurrence of rickets in the congenital form, or to rickets developing in breast fed babies. The condition in babies is very likely identical with rickets in older children, where it is

extremely rare, as at a later age a mixed diet is ingested. Osteomalacia, a disease of the bones found mostly in pregnant women and rarely in males, is apt to be due to the same cause as rickets. The fact that rickets begins in the second half of the first year and usually disappears after feeding with mixed diet (in the second year) has been commenced, is the best proof of the etiological cause of rickets in form of lack or deficiency of vitamins. A further proof is the efficiency of cod-liver-oil therapy; a contrary experience may be due to the fact that cod-liver oil is being now too extensively purified to be of any great therapeutic value. Since we have been able to detect vitamins in the oil, the vitamine theory of rickets has more foundation than ever. From modern research work, we can assume that the addition of phosphorus usually given along with the oil is of no value.

Rickets can be experimentally produced in animals, the most suitable being rats and fowls, in which the disease is similar to if not identical with human rickets. The disease also occurs in wild animals kept in zoological gardens, and is prevalent as a cattle disease in Australia and South Africa, also in some barren German districts in the mountains of Saxony where the cows in winter time receive poor food.

DIET IN RICKETS.—The therapeutic treatment of rickets seems to be an administration of crude cod-liver oil (the refined oil being found of less value), and although a good deal of work is required to place rickets definitely as a deficiency disease, it seems likely that cod-liver-oil therapy can be successfully substituted by the employment of yeast or of one of its vitamine preparations. This is at present being tested clinically on a wide scale. In case of rickets in breast fed babies, the diet of the mother must be carefully inquired into, and in most cases which occur in poor neighborhoods, a vitamine addition either in the form of a more generous diet, or in the form of yeast, is clearly indicated.

Summary

On closing this short chapter on the most important deficiency diseases, we wish to emphasize the fact that the importance of vitamins goes far beyond its importance in the above described diseases. On the other hand, we must warn against too much generalization, such as usually happens in the case of new subjects in medical science. Under normal dietary conditions, we hardly ever run the risk of not having enough vitamins. Only in exceptional cases may this happen, as for instance,

in cases in which a lack of appetite persists for long periods. In convalescence from typhoid fever, when the physician unnecessarily limits the food supply, he is apt to create a real vitamine deficiency. Experience with vitamines teaches us that we are yet far from understanding all our food constituents and their physiological value.

In addition to vitamines, we are constantly consuming a number of substances which are present in minute quantities in our foodstuffs. These substances may act as poisons, but they also may possess great value for the organism. The greatest value in connection with the study of vitamines is the opening up of a new field with regard to nutrition, which remains to be worked out by future generations.

REFERENCES

1. FUNK, CASIMIR. Die Rolle der Vitamine beim Kohlenhydrat-Stoffwechsel, *Ztschr. f. physiol. Chem.*, 1914, vol. lxxxix, p. 378.
2. ———. The Effect of a Diet of Polished Rice on the Nitrogen and Phosphorus of the Brain, *J. Physiol.*, 1912, vol. xlv, p. 50.
3. ———. *Pub. N. Y. Med. J.*, Feb., 1915.
4. ———. The Etiology of the Deficiency Diseases, *N. Y. State J. M.*, 1912, vol. xx, p. 341.
5. ———. Discussion on Beriberi, *Trans. Sec. Trop. Med.*, 1911, vol. v, p. 86.
6. FRASER and STANTON. Studies from the Institute for Medical Research, Federated Malay States, 1911, No. 12.
7. ———. Studies from the Institute for Medical Research, Federated Malay States, 1909, No. 10.
8. BRADON and COOPER. The Influence of Metabolic Factors in Beriberi, *J. Hygiene*, 1914, vol. xiv, p. 331, *Brit. Med. J.*, 1914, vol. i, p. 1348.
9. VEDDER and WILLIAMS. Concerning the Beriberi Preventing Substances or Vitamines Contained in Rice Polishings, *Philippine J. Sci.*, 1913, vol. viii, p. 175.
10. FUNK, CASIMIR. On the Chemical Nature of the Substance Which Cures Polyneuritis in Birds, Induced by a Diet of Polished Rice, *J. Physiol.*, 1911, vol. xliii, p. 26.
11. GOLDBERGER. *U. S. Public Health Reports*.

BIBLIOGRAPHY

- FUNK, CASIMIR. Die Vitamine, Bergmann, Wiesbaden, 1914.
- HART und LESSING. Der Skorbut der kleinen Kinder, Enke, Stuttgart, 1913.
- RECKLINGHAUSEN, v. Untersuchungen über Rachitis und Osteomalacie, Jena, 1910.
- ROBERTS. Pellagra, Kimpton, London, 1912.

CHAPTER XVIII

DIET IN DISEASES OF THE PANCREAS

GEORGE M. NILES, M.D.

Pancreatitis: Symptoms of Pancreatic Insufficiency; Acute Pancreatitis;
Chronic Pancreatitis; Pancreatic Calculi; Pancreatic Cysts.

PANCREATITIS

Until within comparatively recent years, the great importance of diseases of the pancreas was not generally appreciated by the medical profession, but the pathological alterations in the gland were recognized by the older pathologists.

Cowley(1) as early as 1788 pointed out certain pathological changes that occur in individuals afflicted with diabetes, but it was not until 1877 that Lancereaux's Thesis(2) was published, and the relation between the two conditions was definitely proven by the experimental work of Von Mering and Minkowski. In 1866 Spiess recognized and described a condition resulting from hemorrhage into the pancreas as being a direct cause of sudden death, and some years later Zenker, writing on this condition, emphasized its importance, but its true significance was not pointed out until 1886 when Droper(3) directed particular attention to it. In 1889 Fitz(4) presented a great mass of isolated facts concerning pancreatitis, coördinating them to succinctly that since this time, inflammatory conditions of the pancreas have been recognized and brought within the list of diseases which may be readily diagnosed. Senn(5) of Chicago very graphically discussed the subject of pancreatic cysts.

Few organs of the body, when diseased, present more difficulties in the proper apprehension of existing pathologic states than the pancreas. Situated deep in the abdominal cavity, it is rarely accessible to intelligent palpation, except when enlarged by inflammatory exudate, neoplastic growth, or cystic formation. Occasionally in emaciated patients, with empty stomach and intestines and extreme relaxation of the abdominal

walls, it is possible to palpate the pancreas. This, however, is not to be relied upon.

While the diagnosis of pancreatitis is not necessarily included in a chapter of this scope, a brief epitome of suggestive symptoms appears desirable.

Symptoms of Pancreatic Insufficiency.—When both the external and internal secretions are affected, protein and fat can only be partially utilized during digestion, and the carbohydrates go out as glucose in the urine, resulting in emaciation.

When the external secretion alone is involved, the assimilation of fat and protein is incomplete, causing muscle fibers and free fat to appear in the stools. The stools are bulky, and may present a greasy appearance. Coincident with the foregoing, there may be a violent deep-seated epigastric pain, associated with vomiting and collapse. These pains, which are sometimes caused by stones in the duct of Wirsung, are not unlike the pains of biliary colic, but there is no jaundice. The epigastric pain in pancreatic cysts or carcinoma of this organ may radiate to the back, shoulders or sternum, or even to the right hypochondrium.

Occasionally there exists a peculiar pigmentation of the skin. This is usually associated with deposits of pigments in the interstitial tissue of the liver and pancreas; and if the pancreas is seriously involved, there ensues a glycosuria with bronzed diabetes.

An enlarged pancreas may press upon adjacent organs, resulting in various puzzling manifestations. For instance, pressure upon the bile duct may lead to jaundice and distention of the gall-bladder; upon the portal vein, to ascites; the inferior vena cava, edema of the lower limbs; the gastro-intestinal tract, symptoms pointing to the stomach, duodenum, or even colon.

Such etiological points should also be considered as a history of epigastric trauma, previous gall-stone colic, or existing arteriosclerosis. It should be remembered, too, that most affections of the pancreas occur after middle life.

In considering dietetic suggestions in diseases of the pancreas, it is necessary to bear in mind the importance of its *external secretion* in the relation of its ferments to digestion of protein, fats and starch; and its *internal secretion* in the intermediary metabolism of carbohydrates.

One postulate may here be interjected; there are but few, probably no cases of diabetes mellitus without pancreatic insufficiency.

Acute Pancreatitis.—Acute pancreatitis may present at least three or more manifestations of acute inflammation, (a) acute hemorrhagic, (b)

acute suppurative, and (*c*) gangrenous pancreatitis, each of which from a pathologic viewpoint requires separate consideration.

ACUTE INFLAMMATORY PANCREATITIS.—Acute inflammation of the pancreas from hemorrhage is marked by sudden onset with pain in the upper part of the abdomen, with indications of collapse, and a rise of temperature which may go to 103° F., followed by chilly sensations with a rapid pulse. In subjects with thin belly walls, it may be possible to palpate the pancreas.

ACUTE SUPPURATIVE PANCREATITIS.—Acute suppurative pancreatitis is a condition which fortunately is rarely observed. Pus may be diffused through the organ, or it may be localized. Secondary abscesses have been produced in a number of instances in the lesser omentum. The spleen is often enlarged and digestion is greatly disturbed. Patients afflicted with this condition often develop pyemia and septicemia. Jaundice and diabetes are frequently present.

GANGRENOUS PANCREATITIS.—Gangrenous pancreatitis usually follows the acute hemorrhagic form, and may be partial or complete; it has been known to follow the suppurative variety. In this form of pancreatitis the organ becomes totally or partially necrotic—the diseased parts are soft, have a foul odor, and present a dark slaty appearance.

The treatment of acute pancreatitis in the beginning is that of pancreatic apoplexy. The pain must be relieved and symptoms of collapse given proper treatment.

DIET IN ACUTE PANCREATITIS.—The dietetic management of the case is mainly the restriction of fats. The administration of raw pancreatic glands is recommended. Diastases should be ordered with carbohydrate foods, as they in a measure replace the pancreatic juices. Such patients require a liberal nourishing supporting dietary.

Chronic Pancreatitis.—Chronic pancreatitis begins with serious disturbance of the pancreatic functions accompanied by loss of weight and impairment of appetite, though the latter occasionally persists. In some individuals there is no disgust for meat, though this repulsion is generally in evidence. The loss of weight and strength, especially in cases with jaundice, may be so rapid as to simulate cancer, though in ordinary cases marked wasting does not occur.

Admitting the difficulty of satisfactorily diagnosing pancreatic disease, it is naturally not an easy matter to lay down a fixed dietary for such an uncertain and elusive condition. But little has been written on the subject, and in formulating such a dietary the writer has to depend in the main on digestive manifestations plus digestive logic.

Some adventurous therapeutists have, in pancreatic insufficiency, fed pancreas by the mouth in liberal amounts; also administered it by rectal enemata. This has proved more spectacular than useful and is not recommended.

DIET IN CHRONIC PANCREATITIS.—Theoretically, when the pancreatic juice is wanting, fats and carbohydrates should be interdicted. These are not digested in the stomach, and when they fail to be digested in the small intestine, they ferment, gas is produced, uncomfortable distention takes place, and the patient is most miserable. Practically, however, it is best to allow a limited amount of these food elements, aiding their digestion by pancreatic extract or taka-diastase.

When there is an element of uncertainty concerning an underlying pathologic state, it is well to err on the side of liberality in diet. A well fed patient can better overcome errors and indiscretions in his daily intake of food, than one who is well-nigh starved, even if the starving process is scientifically orthodox.

At intervals, it is well to keep the patient on a strictly milk diet, but fully adequate in quantity (3 to 5 quarts daily); and if possible the milk should be peptonized. As many patients cannot bear peptonized milk, this procedure should not be too strongly insisted upon.

When the milk becomes repugnant, there may be given, for a change, predigested meat solutions, egg albumins, flavored in various ways, malted milk and egg, and light broths. Wines and diluted alcoholic beverages are advocated by some, but in this the writer does not concur.

According to Dolinski, the pancreatic secretion is increased by the ingestion of acids and acid drinks, while alkaline drinks diminish the pancreatic fluid. He also thinks that an abundant diet causes an increase in the amount of pancreatic secretion. This may be true if the organ is not too seriously diseased. When, however, the impairment is due to organic changes, it is unreasonable to expect a markedly increased output from any stimulus whatever.

In conditions of alimentary glycosuria with a strong probability of pancreatic disease in the background, approved but not too rigid diabetic diets are helpful. The rule advocated by von Noorden is to begin treatment by testing the carbohydrate toleration of the patient. Carbohydrates are withheld completely for a few days, and then given, slowly increasing them until sugar again appears in the urine, when the limit is reached and the diet is maintained at this standard. By this method a carbohydrate tolerance may be reëstablished in many cases, so that patients who previously had taken carbohydrates in excess, with decided

glycosuria, may continue for years to take a fixed moderate quantity, with a minimum and not particularly harmful glycosuria. It is also found that some patients tolerate one or another form of carbohydrates better than do others. Thus, some may do better with potatoes, others with oatmeal, others with restricted quantities of bread. Periodically (about once in two months) it is well to resort again to an exclusively protein diet for about a week in order to rid the system of any excess of glucose.

SPECIAL DIETETIC METHODS.—A method worked out by Allen, and now under trial, will aid in many cases of pancreatic diabetes. His first step is to make the patient fast until the glycosuria ceases, and then for twenty-four or forty-eight hours longer. He administers some alcohol during the fast, and also sodium bicarbonate for the first few days, but then gives up its use, since its continuance may cause the diaceturia to continue longer than it would otherwise. After the urine of the fasting patient has been sugar-free for from twenty-four to forty-eight hours, the second step is taken, namely the beginning of feeding, very slowly and cautiously, but not according to any fixed program, since it is desirable to individualize the diet to meet the special need of the patient under observation. One requirement only is insisted upon, and that is that the patient shall remain free from both glycosuria and acidosis. The appearance of even a trace of sugar in the urine is the signal for a fast day, either with or without alcohol.

Though the original fast, by which the urine is first made sugar-free, may last anywhere from two to ten days, Allen asserts that subsequently no fast need last longer than a single day. Other and more detailed directions for carrying out Allen's methods may be obtained from textbooks on metabolism. (*See* Volume III, Chapter XII, page 471.)

On the whole, if his nutrition is watched, a certain latitude within reasonable bounds in the daily régime will cause the patient to fare much better than when starved too closely or dieted too rigorously.

Pancreatic Calculi.—Pancreatic calculi are occasionally found in the pancreatic ducts, where they may remain, or from which they may pass through the duct of Wirsung and common duct into the duodenum. If a calculus becomes lodged in the duct of Wirsung, the flow of pancreatic secretions is hindered, leading to symptoms of chronic pancreatitis and digestive disturbances with loss of flesh, and an increase of fat content in the feces. The treatment in this condition is directed to the relief of pain by the proper administration of opiates, and the application of heat to the abdomen, and according to Capriani(6) the rational treatment is

the administration of hydrochloric acid, a liberal vegetable diet, baths and gymnastics.

Pancreatic Cysts.—Pancreatic cysts are usually circumscribed collections of fluids wholly outside of the pancreatic gland. Trauma is recognized as a frequent etiological factor. The fluid is usually of a grayish hue and slightly opaque. The prominent symptoms consist in evidence of a tumor-like pancreatic mass, with inflammatory symptoms, pain, vomiting and collapse. Diet is of some importance, but surgical intervention is imperative.

Until the various pathologic states of the pancreas are better understood, and their symptoms more intelligently apprehended, we must be content with general dietetic rules, all supported by judgment and reinforced by the homely but salutary attribute of common-sense.

REFERENCES

1. COWLEY. *Lond. Med. J.*, 1788, vol. ix, p. 285.
2. LANCEREAUX. *Bul. Acad. de Méd., Paris*, 1877, p. 12; 1888, p. 588.
3. DROPER. *Trans. Assn. Am. Phys.*, 1886, vol. i, p. 243.
4. FITZ. *Boston Med. & Surg. J.*, 1889, vol. cxx, p. 181.
5. SENN. *Am. J. Med. Sci.*, 1885, p. 17.
6. CAPRIANI. *Therapist, Lond.*, 1898, vol. viii, pp. 256-258.

CHAPTER XIX

DIET IN MALIGNANT DISEASE OF THE ALIMENTARY TRACT

FRANK SMITHIES, M.D.

General Considerations: Relations of Diet to Cancer.

Diet in Malignant Disease: Cancer of the Esophagus; Gastric Cancer;
Malignant Disease of the Duodenum; Malignant Disease of the Colon;
Malignant Disease of the Liver and the Gall-Tract.

GENERAL CONSIDERATIONS

Ancient medical writers were fond of ascribing various obscure illnesses to faulty food. Malignant disease, being an affection often arising without warning in robust well-nourished individuals, was readily attributed to excesses of food. Observers were numerous who claimed to have cured undoubted(1) instances of cancer by specially arranged dietetic régimes.

Careful study of statistics of malignant disease compiled by reliable clinicians and pathologists throughout the world has, however, failed to establish that any type of food or any group of food derivatives is capable of producing malignant disease or is able to cure such when it has arisen. In general, laboratory research upon experimental animals has not brought forward evidence of peculiarities in the metabolism of foodstuffs capable of accounting for either the inception or the course of cancer.

Relation of Diet to Cancer.—*Vegetarianism* has been considered for years by both physician and layman as a sort of preventive against cancer. The theory has recently been emphasized and popularized by Bulkley. While it is quite true that among peoples whose food is largely non-fleshy, malignancy at least of the organs of digestion is uncommon (Mohammedans, Native Africans), yet it is likewise true that cancer is infrequently noted in peoples whose food is largely fleshy (Esquimaux, Indians). In support of vegetarianism, it has been suggested that malig-

nant disease is primarily incurred by errors in protein metabolism. Inasmuch as numerous vegetables (beans, peas, etc.) contain as high percentages of protein as do many common flesh foods, it is difficult to see how in one instance the protein may prevent cancer and in the other cause it or influence its growth when the disease has started.

OVER-NUTRITION.—Rather definite information is available with respect to the variations in the inception and progress of malignant disease in well-fed and in under-nourished hosts. Moreschi and Rous have independently established that in experimental animals the rate of growth of transplanted malignant cells is retarded by underfeeding or by variation from diet normal to such animals. Corson-White has observed similar facts, and also that a poor physical state resulting from intercurrent disease decreases the rapidity of growth of transplanted tumors. Overfeeding appears to render experimental animals particularly susceptible to malignant transplants.

In humans, chronic over-nourishment seems to be not without influence toward the development of malignancy. More than sixty years ago, Günsberg stated that the conditions responsible for corpulence were likewise responsible for cancer. In each, he attributed the abnormalities of metabolism to the excess of protein diet. Statistical evidence in support of this theory of over-nutrition is not lacking. Williams(2) has adduced proof that a high cancer incidence is an indication of general prosperity.

Reliable statistics indicate that the highest cancer incidence is found in those communities where people are well housed, well fed and free from cares associated with the struggle for existence. Cancer is apparently relatively infrequent where poverty is universal, in prisons, asylums and poorhouses. Williams has noted that the death rate from cancer is much lower in Ireland than in England. Riches and the associated ease and abundance of food are not very common in Ireland. Further, in those parts of Ireland where the conditions of life are hardest and the people are uniformly under-nourished (e.g., Kerry) cancer mortality is lowest. Hoffman(3) has recently demonstrated that the proportionate mortality from cancer is measurably less among life insurance risks representative of the wage earning population, than it is among those insurance risks from the prosperous group, even though the latter class is subjected to more rigid medical examination upon entrance. At age 40-50 the proportionate mortality for cancer in males was 5.1 per cent in the wage earning group, and 6.7 per cent in the well-to-do division. For females of the same decade the proportionate mortality was 13.7 per cent for the wage earning and 18.5 per cent for the prosperous.

In a study of 921 cases of gastric cancer made by the writer, nearly one-third of the patients were from the rural communities. There were few people uncomfortably rich or extremely poor. The greater number were in easy circumstances, certainly the cases actually fighting for a mere existence were uncommon. A large part of the group was made up of people whose parents were foreign born, or who themselves had emigrated when young from other countries. In many the early years of life had doubtless been strenuous, but their later years had seen the majority installed in comfortable homes and surrounded by many material luxuries. It has been pointed out by numerous writers that just this type of population furnishes the mass of the never-ending cancer army. Environmental change, unaccustomed abundance of meat and drink combined with sedentary life in individuals of the cancer age, together with urbanization of a class of people previously largely rural, appeared to stimulate the metabolism of cells that are perhaps already of a perverted tendency.

In a review prepared for the Actuarial Society of America, Hoffman states that an analysis of the relation of the physiques of life insurance applicants at entry to causes of death was made. Those applicants who were over-weight at entry returned cancer death rates (age 15-19) of 0.9 per 10,000, while the under-weights in the same group had a cancer mortality of 0.8 per 10,000. At ages 30-44, the cancer mortality of over-weights was 3.7 per 10,000 and of under-weights 2.4. At age 45 and over the cancer mortality of over-weights was 15.6 and of under weights 12.0 per 10,000.

It is quite within reason that excessive feeding should put unnecessary work upon the digestive glands. These glands are of a highly specialized type and it is conceivable that such type of gland may be stimulated to chronic overactivity by excessive amounts of food. One can but conjecture what effect upon intra-glandular metabolism this demand for special products may have. We have recently suggested that should these excessive demands ultimately leave an exhausted cell—that is, exhausted in so far as its specific functioning is concerned—such cell might not only be more susceptible to trauma (mechanical, chemical or parasitic), but might be induced to proliferate in a vegetative, undifferentiated manner due to the stimulus supplied to each individual cell from over-nourishment.

Careless mastication of food or the indulgence in very hot or very cold liquids appear to have their main significance with respect to cancer through the possibilities of their causing or aggravating intragastric injury.

It would seem from reliable data at hand, that the factor of chronic over-nourishment in individuals is of greater import than is the choice of food made by individuals. In people who have already developed gastric lesions (ulcers, chronic inflammatory changes in the mucosa, alteration in secretion, etc.) it is not unlikely that food carelessly chewed, food improperly cooked, food that has a tendency to remain in the stomach in lumps for a longer period of time than normal, or food that carries infection, may aggravate an already existing lesion, and at least lay the foundation for the development of malignant disease.

ALCOHOL.—There has been much carelessly expressed opinion with regard to the influence of the drinking of alcoholic liquids or fluids with respect to cancer, especially cancer of the stomach. In this connection, Williams calls attention to certain significant facts: of several hundred female cancer cases, the majority led sober lives; of 116 male cancer patients, age from 40-65, 50.7 per cent had been total abstainers or habitually temperate, 25.7 per cent had been irregular drinkers, while 22.3 per cent had been constant indulgers. The increase in the use of alcohol among women has been relatively greater than among men, yet cancer has proportionately increased among males.

While it has been stated that those whose occupations permit of special ease in obtaining alcoholic drinks (hotel keepers, brewers, traveling salesmen, etc.) have a relatively high cancer mortality, it has likewise been noted that individuals engaged in certain vocations where drinking is popular (printers, iron and steel workers, compositors, paper makers, miners, etc.) appear to be less prone to cancer than do their fellows in the same community. Moreover, although the cancer mortality is high in certain alcoholic consuming countries (Bavaria, Saxony), other sections equally intemperate (Spain, Italy, West Ireland) return a relatively low cancer death rate.

Fenwick(4) states that nearly 40 per cent of his patients at the London Temperance Hospital were total abstainers. Reviewing one hundred fifty cases of cancer of the stomach, Osler and McCrae(5) claim that 51.3 per cent of their patients had used alcoholic drinks, but in only 5.33 per cent was there a history of excessive indulgence.

In the writer's series of 921 cases of gastric cancer, definite figures regarding alcoholism were obtained in 258 male patients. Of this group 53 (20.6 per cent) were total abstainers. Of the 205 remaining cases 11 (5.3 per cent) were pronounced toppers. The balance claimed either an occasional debauch or took small quantities of beer, light wines, "hard" cider, or whiskey, as the desire visited them.

DIET IN MALIGNANT DISEASE

Cancer of the Esophagus.—Before a dietetic régime is prescribed in this affection, a correct diagnosis must, of course, be made. Not infrequently, instances of so-called cancer of the esophagus are proven on careful examination to be diverticula, cardiospasm with diffuse dilatation of the esophagus, mediastinal tumor, strictures associated with lues, or benign ulcer. Lateral röntgenograms readily serve to differentiate such affections from true malignant disease of the esophagus.

DIET IN ESOPHAGEAL CANCER.—The essential dietetic requirements in esophageal cancer are that the food should be, if possible, chosen by the patient according to his likes, that such food should be either thoroughly softened by mastication or already very soft or fluid, that it should not be very hot or cold, which state would make it capable of producing painful spasms, and that under no circumstances should swallowed portions of food have tough fibers or hard, sharp edges.

In lesions involving the *upper esophagus*, swallowing is sometimes interfered with. When the Röntgen examination shows the affection to be located in such a situation, then from the first it may be necessary to introduce the food into the esophagus by means of a small soft stomach tube, a soft catheter, or a duodenal bulb of the common type. (*See* Volume III, Chapter XXVI, "Special Methods of Feeding," page 741.) In the last event, the small tube may be left *in situ* for many days, even weeks, and nourishment of sufficient quantity given without causing the patient annoyance. Early feeding in this manner may permit of a certain amount of beneficial sloughing of the malignant growth, and the disappearance of inflammatory edema, so that later it may be possible for the patient to take food without the tube for a considerable time. At the end of this chapter is listed a selection of fluid foods that may readily be given through the tube in high lying lesions of the esophagus. When the patient is able to swallow, care should be taken that the swallowing function be tested first by the administration of liquid foods before very soft or partly solid diet is administered. If this arrangement is followed, then the avoidance of annoying retention is certain, and the possibility of regurgitation of food from the upper esophagus into the larynx or lung prevented.

Where the malignant growth lies in the *middle third* of the esophagus, liquid or very soft foods are usually readily tolerated until there is definite stricture with obstruction. Until such complication occurs, it is well to permit the patient to choose his own diet from a supplied list of soft

or liquid foods. It is quite necessary to insist that *sufficient* food be swallowed. Esophageal residues can be prevented if from six to ten small feedings daily are suggested. As the stenosis becomes marked, hourly feedings of quantities as small as one ounce or a dessertspoonful are indicated.

Where feeding *per os* results in pain on swallowing, the cause is commonly a direct irritation of the ulcerated cancer or pronounced esophageal spasm due to irritation of the raw surface. It is advisable in such instances that the raw surfaces be protected by the administration of such medicines as orthoform (gr. 5) or bismuth subnitrate (gr. 10) about a quarter of an hour before feeding. The painful spasms are best controlled by frequent small doses of tincture of belladonna. In obstinate cases, morphin and atropin should be administered hypodermatically. It is often necessary to give these medicines early in the course of the affection, and not rarely three or more times daily. Commonly, feeding in esophageal cases is facilitated if the above described cautions are heeded, and eating is rendered painless.

Where annular carcinoma involves the *main esophageal channel*, stenosis may occur early and dysphagia lead to rapid emaciation and exhaustion. In instances of this type, feeding by means of a stiff hollow bougie passed through the stricture by means of a silk cord guide, aids in maintaining body strength. Such a procedure may at times carry a patient through a critical period, during which beneficial effects upon the growth are obtained by means of the local application of a radium capsule. Unless such attention is given to the feeding, the radium treatment may prove entirely worthless.

When cancer early involves the *lower end* of the esophagus or the cardiac sphincter, painful dysphagia is the rule. Esophageal retention, particularly of solid or semi-solid foods, may be the first sign of disease—very soft or liquid foods causing the least disturbance.

When growths are demonstrated to involve such portion of the esophagus, the dietetic indications are plain. Very soft, well cooked foods, free from fiber, skins, hard edges or hulls are indicated. The patient should choose them just so long as he has a desire for food, provided that these general principles are followed. Before the feedings, it is well to protect the surfaces of the growth by the administration of orthoform or bismuth, and to counteract spasm with belladonna or atropin. Certain obstinate instances, where from the first all feeding is painful, and where annoying residues, associated with vomiting, lie in the esophagus, call for the early direct introduction of food into the stomach

through a catheter passed upon a silk cord guide. Such tubes can be passed at each feeding, but it is usually better to leave *in situ* a tube of small caliber, with its distal end constantly in the stomach. Sufficient nourishment can be given in this way, and the beneficial local effect of x-ray or radium therapy perhaps enhanced.

If an operation, such as gastrostomy, is contemplated, the operation by these combined procedures can be rendered safer because the patient will become a better surgical risk. Where a rapidly growing tumor early brings about practically complete obliteration of the esophageal lumen, gastrostomy should, of course, be performed, rectal feeding instituted, or both procedures carried out. (See Volume III, Chapter XXVI, "Special Methods of Feeding," page 715.)

An enema which we have introduced into the lower rectum with considerable success is made up of

Alcohol (50%) 1 ounce—30 c.c.

Glucose sirup (or honey) 1 ounce—30 c.c.

Normal Salt Solution q.s. ad. 8 ounces—240 c.c.

Such a clyster should be given from four to six times daily at body temperature, and by the drop method. It is usually well borne and practically all absorbed. If there is distress following its administration, such usually arises from the nutrient enema being given into the sigmoid instead of into the rectum, its being too cold, or administered too rapidly. Where patients stand rectal feeding poorly, ten drops of tinctura opii and five drops of tincture belladonna may be added to each nutrient enema.

Gastric Cancer.—After the position and the extent of the growth have been recognized by means of fluoroscopic examination or x-ray plates, one is commonly enabled to plan intelligently a dietetic régime. The Röntgen examination generally gives a relatively correct guide as to whether dietetic measures shall be carried out in order to aid nutrition until the cancer has made such inroad as to cause death, or to plan a brief dietetic course that will enable the patient to gain sufficient strength to withstand operative procedures.

When cancer is located in the cardiac two-thirds of the stomach, it is quite evident that surgical procedures are contra-indicated, inasmuch as it is not mechanically possible to remove tumors situated in these parts of the viscus. The feeding of patients in this class consequently resolves itself into supplying a proper amount of food to reduce suffering as much

as possible and to aid in increasing the resistance against the cancer invasion.

DIET IN GASTRIC CANCER.—Regarding the kind of food indicated in the above type of case, one should avoid prescribing rigid dietetic schedules that will continuously remind the patient of his condition. Moreover, the lack of variety in these diets renders all feeding difficult. It is well to let the patient choose his own food as far as possible. Very often it will be found that foodstuffs which are theoretically contra-indicated are craved and relished by the patient, and apparently cause no distress, or at least no greater distress than does a diet carefully devised according to ultra-scientific principles. Nearly all these patients do well on a diet which is free from excess fats, tough fiber of meat, fruits or vegetables, and on a minimum of pastry. If foods are well cooked, soft, pleasing to the eye and taste, and given in a moderate quantity at frequent intervals, feeding may be continued for a long time without discomfort. In many instances weight loss becomes less rapid and the general state of the patient improves markedly.

The following dietaries have been found useful in this type of malignant disease:

DIETARY FOR CANCER OF THE STOMACH (Boas)

8 A.M.	Milk and tea.....	50 gm.	(67.5)	
	Zwieback.....	50 "	(174.8)	
	Butter.....	10 "	(71.3)	336.60 calories
10 A.M.	Broiled perch.....	100 "		71.80 "
	Toasted bread.....	50 "		129.90 "
	Calves' brain.....	100 "	(140)	
	Sweetbread.....	90 "		
	Eggs, 2.....	160 "		
12 M.	Milk and rice.....	150 "		260.00 "
	Veal.....	100 "		142.45 "
	Macaroni.....	50 "		126.30 "
3 P.M.	Tea and milk.....	100 "	(67.5)	
	Cakes.....	50 "	(187)	254.50 "
7 P.M.	Cream.....	100 "		214.60 "
	Zwieback.....	50 "		
	Butter.....	10 "	(71.3)	
	Ham (minced).....	130 "	(131)	376.30 "
9 P.M.	Cream.....	50 "		107.30 "
	TOTAL.....			2,016.75 calories

DIETARY FOR CANCER OF THE STOMACH (Wegele)

			Albumin	Fat	Carbo- hydrates	Alcohol
<i>Morning:</i>	Maltoleguminose cocoa...	150 gm.	6.0	4.00	13.5	
<i>Forenoon:</i>	Kefir.....	200 "	6.6	4.50	3.8	1.0
<i>Noon:</i>	Maltoleguminose soup...	150 "	4.0	0.15	9.3	
	Scraped beef.....	100 "	20.0	6.00		
<i>Afternoon:</i>	Maltoleguminose cocoa...	150 "	6.0	4.00	13.5	
<i>Evening:</i>	Scraped ham.....	100 "	25.0	8.00		
	Tapioca.....	150 "	7.0	5.00	8.0	
10 P.M.:	Kefir with the cocoa....	200 "	6.6	4.50	3.8	1.0
	Honey with the kefir.....	30 "	0.4	.....	22.0	
	Cognac.....	20 "	.....	.....	.....
<i>During the day:</i>	Zwieback.....	50 "	6.6	1.00	35.0	14.0
	Total.....		87.6	37.15	108.9	16.0
	Calories.....		360	350	450	100
	ENTIRE NUMBER OF CALORIES.....					1,260

DIETARY IN GASTRIC CARCINOMA (Zweig)

<i>Breakfast:</i>	½ liter of milk.....	500 gm.				
	Toast.....	40 "				
	Butter.....	10 "			504.0 calories	
<i>Luncheon:</i>	Oatmeal soup.....	15 "			90.0	"
<i>Noon:</i>	Vegetable green soup.....					
	Yolk of egg, 1.....					
	Roast beef, fowl or fish, finely chopped ...	150 "				
	Toast.....	40 "				
	Mashed potatoes.....	100 "			667.4	"
<i>Afternoon:</i>	Milk cocoa.....	250 "				
	Yolk of egg, 1.....					
	Zwieback.....	30 "			400	"
<i>Evening:</i>	Flour milk gruel, viz.:					
	Milk.....	250 "				
	Tapioca, oatmeal.....	20 "				
	Sugar.....	15 "				
	Toast.....	50 "			320.0	"
	TOTAL.....					1,981.4 calories

Whatever dietetic course is followed it should be emphasized that each day the patient should have passed from his stomach into the duodenum at least 1,500 calories of nourishment. If more can be administered without distress, then the patient should be permitted this excess.

Digestion, the tolerance for food and greater benefit from ingested

food are, undoubtedly, improved if daily, or at least as often as three times a week, the patient's stomach is carefully lavaged with from two to four liters of a solution containing one dram of artificial Carlsbad salts to the liter. These solutions should be as hot as can be comfortably borne. The lavage is usually attended with the greatest benefit if it is performed in the morning or late at night. In this manner, food accumulations are removed from between papillomatous-like cancer nodules, disintegrated blood clots and sloughing tissues. Such removal seems to have a decided benefit upon digestion, while it certainly improves the appetite and general well-being.

Recipes of a few of the suitable foods to be used in this class of case will be found tabulated at the end of the chapter.

DIET IN OBSTRUCTION OF THE PYLORIC ZONE.—When there has been rapid growth of the tumor, producing stricture in the body of the stomach (hour-glass), or obstruction in the pyloric zone, the problem of feeding is, from the first, a difficult one. This occurs as a consequence of the stomach constantly containing food residues and the products thrown off by the growing cancer.

In this group of cases, abdominal distress, nausea and vomiting are early manifested, and act as serious hindrances to sufficient nourishment reaching the duodenum and jejunum, the parts most intimately concerned with food digestion and absorption. In the hour-glass cases, the Röntgen examination sometimes demonstrates that the tumor can be removed by cone-like excision, or if a sufficient portion of the greater curvature is free from the growth, that a gastrojejunostomy can be performed. If this is the case, the patient should be prepared for operation as quickly as possible. Rectal feeding (using the formula above given under Esophagus), or feeding through a catheter passed beyond the hour-glass stricture, should be at once instituted. Just so long as the patient is a fair surgical risk, operative procedures should be recommended.

Where the growth is located in the pyloric zone, one generally has to deal with a cancer having ulcer characteristics, or with a soft nodular growth that more or less completely obstructs the lumen. In the ulcer-like carcinoma, the passageway is generally more definite and free than it is where multiple nodules have pushed their way into the cavity of the stomach. In the latter event, we have to deal with an extremely tortuous channel in which puddles are formed by foods introduced directly into the stomach. These puddles become pools filled with bacteria, food residues, and the products of cancer disintegration.

In the ulcer-like cancers direct feeding of small quantities into the

stomach may be possible for a long time, provided the food is very soft or fluid. Carbohydrate mixtures, particularly fluids, leave the stomach in the shortest time; protein mixtures remain in the stomach on an average perhaps of an hour or two longer than do carbohydrate mixtures: they consequently act as more prolonged sources of irritation on the malignant tissue and permit greater bacterial proliferation. Fatty mixtures leave the stomach very slowly. In this way they do damage not only mechanically, but also through the resulting chemical and bacterial changes. Frequent feeding of carbohydrate gruels and soft mushes would thus appear to be indicated. Gruels made from various cereals and vegetables strained through the colander are usually well borne and contain considerable nourishment. They may be reënforced by fruit juices and very soft porridges (cream of wheat, farina, well cooked, mashed rice, oatmeal, etc.). In numerous instances it is also possible to add clear broths made from fresh meat and egg preparations. Drinks such as clear tea, light wines, and occasionally thin cocoa, are both stimulating and not without food value.

In this class of case, lavage should be instituted daily, preferably at night, or early in the morning. The general strength not rarely requires further augmenting by rectal nourishment.

Where the pyloric lumen is not too tortuous and still of moderate caliber, direct feeding into the duodenum by means of one of the commonly used tubes (those of Kanaval, Rehfuß, Palefiski or Einhorn) answers very well. The foods given through these tubes should be thin liquids and preferably administered by the drop method. Care should be taken that in addition to the foodstuffs administered directly into the duodenum, sufficient water be given every twenty-four hours. At least three pints of water should be given in addition to the food mixture. In some instances the water may be mixed with sugar, honey, tea or coffee. Wines and fruit juices may be given direct into the duodenum. When milk is given, it should be always parboiled, and carefully strained through several layers of fine gauze before being passed through the rubber tube.

When the pyloric channel is very tortuous, it is with difficulty that the duodenal tubes pass from the stomach. This is true no matter how small they may be or how carefully passed. Röntgen examination in these instances usually demonstrates that the distal end of the duodenal tube has not passed beyond the stomach. In severe cases where an operation is refused, or where the patient's condition is so low as not to permit radical surgical procedures, the duodenal catheter may be directly passed upon a silk cord guide after the manner suggested by Henry Plummer

and by Hess. These catheters can be absolutely proven to pass from the stomach, and nourishment injected through them is sure to reach the duodenum. Another advantage of this method is that the catheter need only be passed at the time of feeding, without its being necessary for the patient to be constantly annoyed by having the tube in his throat and mouth. Even with established duodenal alimentation, gastric lavage should be continued as above described. This keeps the stomach clean, prevents the duodenum's being befouled by products of tumor disintegration, and improves the patient's appetite and general state.

In all cancers involving the pyloric portion of the stomach, rectal feeding is required in addition to the food introduced by way of the stomach. A possible exception might be a small group of scirrhus growths that extensively infiltrate the pyloric portion of the stomach. These are not rarely of gristle-like character, and hold open for a long time the outlet of the stomach so that even though the growth be very extensive the viscus empties very rapidly. This emptying is not due to muscular activity on the part of the stomach: the food promptly leaves the stiffened stomach walls apparently by gravity alone—it drops into the duodenum as does water poured from a kettle spout or through a funnel.

In cases of this type, although the stomach shows no retention upon careful examination, soft or liquid foodstuffs should be given from the start. If food made up of lumps or dense masses is administered, it will leave the stomach so quickly that in a short time the duodenum is crowded, its digestive juices are overtaxed, and before very long obstinate diarrhea supervenes. The stools in such diarrheas are quite characteristic, containing elements of unbroken food that has apparently passed through the intestinal canal without contributing much to body nourishment.

DIET IN INSTANCES OF ULCUS CARCINOMATOSUM AND GASTRIC CANCER ASSOCIATED WITH HEMORRHAGE.—Where the hemorrhage is sudden and profuse, all food by the mouth should at once be interdicted. If after the first sudden gush of blood there is only occasional hematemesis, but considerable retching persists, gastric lavage with water at a temperature of at least 110° F. should be performed. The patient should be put to bed and kept absolutely quiet. The administration of opiates hypodermatically is generally of aid both in keeping the patient quiet and lowering the blood pressure. An opiate also eliminates gastro-intestinal peristalsis and facilitates the arrest of bleeding.

Rectal feedings should be instituted at once. A glucose-alcohol-normal salt nutrient enema, above described, may be given by the drop method

every four to six hours. If there has been profuse hemorrhage it may be necessary to administer a normal saline solution continuously by the drop method. In such event the nutrient enemata may be postponed until examination of the blood reveals that the hematopoietic function of the bone marrow is again active.

In instances where gross hemorrhage complicates the cancer, mouth feeding should not be again established until occult blood tests have demonstrated that the hemorrhage has ceased. If seepage persists for a long time, it may cease following the transfusion of whole human blood, after the method devised by Nelson Percy.

When mouth feeding is instituted, a diet similar to the following may be safely advised:

1st week:

Four pints of hot milk daily with indicated medicine.

2nd week:

Same as first, and two to four raw or soft-boiled eggs in addition.

3rd week:

Same as second, and two to six pieces of very dry toast in addition.

4th week:

Same as third, and all kinds of milk or cream soup in addition.

5th week:

Same as fourth, and all kinds of mush or well boiled rice in addition.

6th week:

Same as fifth, and broiled beef or mutton well ground in addition; chew and swallow the juice, but not the fiber.

Later add cooked vegetables and cooked fruits, adding only one kind each week.

Later chopped beef or mutton may be swallowed.

Even after recovering fully, pastry, pie, pancakes, pickles, pork or rich puddings are forbidden. No cake, candy or canned goods. No raw vegetables or raw fruits, unless the latter are perfectly ripe and not sour.

DIET IN MALIGNANT DISEASE OF THE STOMACH AFTER PYLORECTOMY OR GASTROJEJUNOSTOMY.—During the first three days nothing is given by mouth but sips of hot water. Three times daily a quart of normal saline solution is administered per rectum by the drop method. When mouth feeding is again instituted, from one to three ounces of thin cereal gruel or thin creamed soup are administered warm at two hour intervals. If there is a tendency to gastric acidity, a dessertspoonful of milk of magnesia may be administered a half hour after each feeding. By the sixth day, the patient should be ready to take very thin cereals and thicker gruels and cream soups. When milk is administered, it should always be parboiled. Occasionally, buttermilk is well borne from the first; if it

can be taken it should be allowed. A quart daily can frequently be ingested without distress. By the end of the tenth day, the patient should be on a fairly normal diet, but care should be taken that until gastric secretion has become active or gastric motility normally established, frequent feedings (6-8 daily) are administered.

At the end of the third week after operation, when the patient is ready to leave the hospital, a diet similar to the following may be given:

He should be advised to drink as nearly as possible, two quarts of rich milk, preferably hot, each day, always adding from two to four teaspoonfuls of milk of magnesia, or four teaspoonfuls of lime water to each pint of milk.

He should eat from two to six raw or soft-boiled or poached eggs a day.

Aside from this, he should eat broiled, stewed or boiled beef, mutton, or fresh fish, cooked vegetables and cooked fruits, and all kinds of thoroughly cooked mush and breakfast foods, also very ripe non-acid fruits. The patient must chew the meat and swallow the juice, but not the pulp.

The cancer patient after such an operation, should eat no candy, sugar or vinegar; no pastry, pie, pickles, pancakes, pork or spiced foods, and no unripe or acid fruits, no vegetables that have not been thoroughly cooked.

He should chew all food for a long time in order to mix it thoroughly with saliva.

He should drink neither strong tea nor coffee, nor anything containing alcohol.

He may drink hot water with cream, or hot milk with fresh cream, or buttermilk with fresh cream with his meals or half-way between meals or at bedtime.

He should rest at least fifteen minutes before dinner and supper. The patient should sleep with wide-open windows, and go to bed early.

Malignant Disease of the Duodenum.—Cancer of the duodenum is a relatively uncommon ailment. It occurs as a consequence of extension of malignant disease into the first portion of the gut, as a primary affection at or about the papilla of Vater or secondary to neoplasms of the pancreas, gall-tract, retroperitoneal glands, liver, omentum or right kidney. The affection is commonly productive of some grade of stenosis of the duodenum. Early resection of the growth is indicated in order to save life.

DIET IN CANCER OF DUODENUM.—Palliative dietetic treatment consists in supplying at least from 1,000 to 2,000 calories to the portion of the bowel distal to the malignant process. This can be accomplished by the administration of very soft or liquid bland diet *per os*, or, if Röntgenographic examination permits localization of the tumor, feeding directly into the gut through a duodenal tube or catheter. (See Volume III, Chapter XXVI, "Special Methods of Feeding," page 741.) If painful spasms of the bowel complicate the stenosis and render food retention difficult, an attempt should be made to alleviate such by the administration

of tincture of belladonna, orthoform, bismuth or *petrolatum liquidum* from fifteen to thirty minutes before the feedings. Meals should be of not more than eight ounces each, and six to ten feedings daily should be arranged.

If the duodenal stenosis is of marked degree, daily gastric lavage may be required to prevent nausea, retching and vomiting. Rectal feeding may be necessary early in cases of this type.

Malignant Disease of the Colon—DIET IN CANCER OF THE COLON.—There is no special dietetic indication in cases of cancer of the colon other than to see that sufficient food (1,000 to 2,000 calories daily) is ingested and that the food is non-irritating. Liquid foodstuffs, or starvation, are indicated in the presence of hemorrhage. As the hemorrhage subsides, very soft foods preferably low in protein and fat may be administered. Traumatism of the intestinal mucosa may be further prevented by the administration of from 1 drachm to 1 dessertspoonful of *petrolatum liquidum* in an ounce of warm cream a half hour previous to the feedings.

Malignant Disease of the Liver and Gall-Tract—DIET IN CANCER OF THE LIVER AND GALL-TRACT.—Apart from limitation of the ingestion of excess of starches and fats, there are no special dietetic indications in malignant disease of the gall-bladder or liver. Emergencies have to be taken care of as they arise. In view of the fact that extensive cancer of the gall-bladder or liver may involve portions of the stomach, duodenum or the small or large bowel, stenoses, perforation or hemorrhage in these portions of the gastro-intestinal tract should be looked for or guarded against. When these crises arise mouth feeding has usually to be stopped until the acute upper abdominal condition has subsided. In such event rectal feeding may be conveniently resorted to in order to conserve the patient's strength until nature or surgery take care of the acute complication.

Malignant disease of the gall-tract associated with stenosis of the bowel calls for bland, soft or liquid diet, similar to that suggested in cases of malignant disease involving the pylorus.

Duodenal feeding has been successfully tried in certain instances where there is a rather high lying stenosis of the antrum of the stomach or the first third of the duodenum. In stenoses located in these positions, it is possible to pass the duodenal bulb beyond the narrowed lumen of the gut, and thus food is passed directly into the duodenum or jejunum and absorption rendered possible. Not infrequently the free administration of opiates or the frequent employment of gastric lavage are necessary to

make the patient comfortable, even when the diet is most carefully selected.

DIETETIC SUGGESTIONS AND RECIPES FOR THE FEEDING OF INSTANCES OF MALIGNANCY OF THE ALIMENTARY TRACT¹

LIQUID PREPARATIONS

Tea:

To a small half-teaspoon of fennel, chamomile or "Green" tea add one pint of boiling water, cover with a clean dish and steep for two or three minutes, or till the tea is of a light yellow color; then pour through a clean sieve or muslin. It should be weak.

Barley Water:

Soak one tablespoonful of washed barley (pearl) in water over night; pour off water, add one quart of fresh water and boil down to one pint. Strain through fine cloth. Keep in ice chest.

Oatmeal and Rice Water:

Are prepared in the same manner, only boiled more slowly. They may be made from barley, oatmeal or rice flours by using one tablespoonful to one and one-half pints of water and boiling for 20 minutes down to one pint in an open stew pan, stirring constantly.

Oatmeal, Barley and Wheat Jelly:

Use twice the quantity of cereal and same quantity of water.

To Dextrinize Barley or Oatmeal Water:

Cool to 105° F., add one teaspoon extract of Malt, Cereo, Liquid Taka-diastase or Diazyme, stir, allow to stand for 15 minutes, when the gruel becomes thin and watery. Add pinch of salt, stir only to mix, cook, strain and put in ice chest.

Albumin Water:

To $\frac{1}{2}$ cup of cold boiled water add the white of one fresh egg and a pinch of salt. Stir very thoroughly. A piece or two of artificial ice may be added before stirring. One-half teaspoon of sugar and orange juice may be added if not contra-indicated. Barley water may be used.

White of Egg and Digested Gruel:

Whites of two eggs may be added to one pint of dextrinized barley, oatmeal, etc., gruels. Stir thoroughly.

Arrowroot Water:

One or two teaspoonfuls of arrowroot, one pint boiling water. First mix the arrowroot with a little cold water. Then pour on the pint of boiling water and boil up in a saucepan for five minutes. It should be quite thin, smooth and clear when made.

¹ We are indebted to Dr. J. Hess, of the Michael Reese Hospital, and Dr. A. J. Ochsner, of the Augustana Hospital, Chicago, for some of the diets and recipés above suggested.

Arrowroot:

Take one teaspoonful of arrowroot. Mix it with a spoon, with 1 tablespoon of cold milk. When well mixed, put in a saucepan in which is $\frac{3}{4}$ of a pint of milk, or a pint (if the arrowroot is required thinner), quite warm, but not boiling. Stir gently, but not too slowly, and always the one way, from left to right, with a wooden stick or the handle of a wooden kitchen spoon if you have not a round stick, all the time till it thickens and is of a smooth consistency like cream, when it will be ready for use.

Pasteurized Milk:

Place milk in cold water bath, having water to level of milk; bring milk to temperature between 155° to 167° F. for 15 to 20 minutes.

Sterilized Milk:

Place milk in cold water bath, having water to level of milk, bring milk to temperature of 212° F. for 15 to 20 minutes.

Chymogen or Pepsin Milk:

Boil milk for 5 minutes, cool to 104° F. and add one full teaspoonful of chymogen, or pepsin to each quart of milk and stir for $\frac{1}{2}$ minute. Let it come to a clabber by allowing it to stand for 15 minutes, then beat it well until the curd is finely divided. Do not heat above 100° F. when preparing individual bottles for feeding.

Buttermilk:

A pure culture of lactic acid bacilli is added to raw, pasteurized or boiled skimmed milk in an earthenware dish, and allowed to stand at about 80° F., 15 or 20 hours or until the casein is coagulated. Stir vigorously in a churn, or with a spoon or egg beater, until the curd is very small, and then push the contents through a fine-wire strainer with a spoon. If the buttermilk is too thick, add a small amount of water. When the buttermilk is once made, a small portion (about four ounces) may be used as the inoculating agent for the next supply to be made. In this way the original culture may be made to last from six to eight weeks. The quality and action of the product made will vary but little. Add four ounces of buttermilk to one quart of fresh milk, incubate and follow the above outline. Sometimes the milk will not coagulate, although it may smell sour. Stirring gently with a spoon will often produce coagulation in a few minutes. The fat present will rise to the top and when coagulated appears as a brownish-yellow scum, which may be removed before the curd is broken up. At the present time the market is flooded with tablets for the preparation of buttermilk, but one must hesitate before using them to prepare milk. A pure culture should be used or one recommended by the physician.

Buttermilk Mixture:

To a few tablespoons of buttermilk, add $2\frac{1}{2}$ level tablespoons of flour to make a paste. Make up to 1 quart with buttermilk. (1) Bring to a boil, withdraw from fire. (2) Bring to a boil, withdraw from fire. (3) Add 4 level tablespoons of sugar and bring to a boil for the third time. (1, 2, and 3 should require about 20 minutes' time). Make up to 1 quart with boiled water if it has boiled away; put on ice.

Peptonized Milk:

To 1 pint milk add one peptonizing tube, mix in a little cold water and add to milk. Place in cold water bath and bring milk to 120° F., allowing milk to stand in bath for 9 minutes. Place immediately on ice or, if desirable, to keep, heat to boiling to prevent further peptonizing.

Milk Curd:

1 quart milk, heat to 100° F. Add 1 level tablespoon of chymogen, let stand 20 minutes, then hang in sterile muslin bag for 1 hour.

SOUPS

Keller's Malt Soup:

To 11 oz. (330 gm.) of warm milk, gradually add 1½ oz. (50 gm.) of flour, stir constantly, then pour through a clean sieve or muslin. In another dish dissolve 3 oz. (100 gm.) of Loefflund's or Borchert's Malt Extract with potassium carbonate in 20 oz. (600 gm.) of boiled warm water. Then mix both solutions, put on the fire, stir continually, and boil for 2 or 3 minutes.

Cream Soups:

Cream soups may be made from vegetable pulp using one tablespoonful of cooked potatoes, peas or asparagus to one-half cup of water in which the vegetables were cooked, one-half cup of sweet milk and one-half teaspoonful of flour with a little butter and salt. Cook another minute or two. Strain if necessary. Serve.

Corn or tomatoes may be used in the same manner using two tablespoonfuls of strained vegetables with about one-third water and two-thirds milk. When tomatoes are used, add a small pinch of soda to tomatoes before adding other ingredients.

Vegetable Soup:

¼ lb. lamb stew cut in pieces, 1 potato cut in pieces, 1 carrot cut in pieces, 2 stalks of celery cut in pieces, 1 tablespoonful of pearl barley, 2 tablespoonfuls rice, 2 quarts of water. Boil down to one quart, boil three hours. Add a pinch of salt and strain before feeding.

Lamb or Veal Broth:

Lean meat, chopped fine, 1 pound; cold water, 1 quart; pinch of salt; cook slowly two or three hours, to 1 pint; add water from time to time so that when finished there will be 1 pint of broth; strain; when cold skim off fat.

Chicken Broth:

Small chicken or ½ of large fowl, with all skin and fat removed; chop bones and all into small pieces; add 1 quart boiling water and a little salt; cover closely and allow to simmer over slow fire for 2 hours. After removing, allow to stand 1 hour, then strain. Add water if necessary from time to time so there will be one pint when finished.

Beef Juice:

Take ¼ to ½ pound of round steak, broil slightly, cut in small pieces and then press out the juice with a meat press or potato ricer and add a small pinch of salt. Feed fresh, or warm before giving, but do not heat sufficiently to coagulate the albumin.

Farina Soup:

To one pint of meat broth, gradually add while stirring one even tablespoon of farina and boil down to one cup ($\frac{1}{2}$ pint) in about 20 minutes. It is a good plan to boil the farina for 15 to 20 minutes before adding it to the broth; then broth and farina need to be boiled together but ten minutes.

VEGETABLES

Potatoes:

Boil some potatoes in some salt water in the ordinary way until they are thoroughly done, and then mash through a very fine sieve and add a little butter.

Cauliflower:

One small head of cauliflower, one quart of water, one teaspoonful of flour, one teaspoonful salt, one-half cup of sweet milk, one teaspoonful butter. Clean and break up cauliflower and cook it twenty minutes in boiling water with a little salt. Drain. Make a sauce with one-fourth cup of water in which the cauliflower was cooked, then butter, flour and milk. Pour sauce over cauliflower. If very small pieces are desired, mash with a fork or rub through a coarse sieve.

Spinach:

Cook spinach in salted water until tender. Pour cold water over it and drain. Chop fine or rub through a coarse sieve. To two tablespoonfuls of spinach, add one teaspoonful of fine bread crumbs, one half teaspoonful melted butter and a little salt. Reheat and serve.

Asparagus:

Cook one-half of a bunch of asparagus in about a pint slightly salted water. When tender remove stalks one by one. Place on a warm plate and remove pulp by taking hold of the firm end of stalk scraping lightly with a fork towards the tip. Use pulp only. Make a sauce with one-fourth cup of water in which asparagus was cooked, one-fourth of a cup of milk, one teaspoonful flour, a little butter and salt. Dip a small piece of toast in the sauce. Take what is left of the sauce and mix with two tablespoonfuls of asparagus pulp. Reheat. Place on toast and serve.

Carrots:

Cook one-half pound of young carrots in a pint of fat-free soup stock or slightly salted water, adding more if it cooks away before they are done. Rub through a sieve, add one teaspoonful of bread crumbs, a little butter and salt. Reheat and serve.

Beans:

Soak two ounces or four tablespoonfuls of beans and cook them slowly in a good deal of water until they are soft, but not broken. Rub through a sieve, add one cupful of soup stock and let them cook for one-half hour adding more stock if it boils away. Mix a little butter and flour, about a teaspoonful of each and a little salt. Add to soup. Return to fire and cook for a few minutes.

Green Peas:

Cook a cupful of green peas in boiling, salted water until they are done. Drain, saving the water in which they are cooked. Rub through a coarse sieve. Make

a sauce of two tablespoonfuls of water in which the peas were boiled, two tablespoonfuls of sweet milk, one-half teaspoonful flour, one-half teaspoonful of fine bread crumbs. Mix all together. Reheat and serve.

FRUITS

Orange Juice:

Take sweet orange, cut in halves and squeeze out juice by hand or with a lemon squeezer, strain, put on ice and use as ordered.

Prune Juice:

Take $\frac{1}{2}$ pound of prunes, wash thoroughly, cover with cold water and soak over night. In the morning, place on stove in the same water and cook until tender, add 1 teaspoonful of sugar and strain.

Apple Sauce:

Take 6 apples, peel and cut them in quarters. Place them in an enameled dish, sprinkle over them one tablespoon granulated sugar, add one cup cold water, put the dish on the stove and boil the apples to a mush (about 30 minutes).

BREADS

Use only white bread that is a few days old, or fresh white bread that has been dried by placing it in the oven.

Zwieback:

Cut home-made biscuit in halves, place in pans and put them in an oven until yellowish brown. Zwieback can also be bought in any grocery store.

EGGS

Use only soft-boiled or poached eggs. Be sure that the eggs are fresh. Drop egg in boiling water, immediately turn flame out and allow to stand for five minutes.

MEATS

Raw or slightly cooked beef, scraped and seasoned can be fed in small amounts.

Take meat, preferably from the round, free from fat. Place on a board and scrape with a silver spoon. When you have the desired amount of meat pulp, shape into a pat and broil on a hot, dry spider. Do not cook too long. When done season with a little salt and butter. Serve. A few drops of lemon juice may be added.

Later beefsteak, roast-beef and mutton-chops are the best and should be broiled.

By no means fry any meat. Soup meat well cooked may also be given. All meats should be very finely cut before feeding.

PUDDINGS

Cornstarch Pudding:

Take 1 pint of milk and mix with it two tablespoonfuls of cornstarch; cane sugar, one tablespoon. Flavor to taste; then boil the whole 8 minutes; allow to cool in a mould.

Pap:

Put one pint of milk on to boil, add butter the size of a walnut. Beat one egg thoroughly; when milk boils, add the beaten egg, stirring constantly. Mix $1\frac{1}{2}$ tablespoonfuls flour into a paste and add to mixture, stirring constantly. Allow mixture to boil ten minutes; just before taking from the fire add a pinch of salt. May be eaten plain, or with milk and sugar as directed.

Custard Pudding:

Break one egg into a teacup and mix thoroughly with sugar to taste; then add milk to nearly fill the cup, mix again, and tie over the cup a small piece of linen; place the cup in a shallow sauce-pan half full of water and boil for ten minutes. If it is desired to make a light batter pudding, a teaspoonful of flour should be mixed in with the milk before tying up the cup.

Baked Custard:

1 egg, 1½ tablespoons sugar, ⅔ cup scalded milk, nutmeg or cinnamon, few grains of salt.

Beat egg slightly, add sugar and salt. Pour hot milk on gradually; strain into small buttered moulds. Sprinkle with nutmeg or cinnamon, set in pan of hot water, and bake in a slow oven until firm. Remove from mould for serving.

Arrowroot Pudding:

Arrowroot, 3 teaspoonfuls, cane sugar 1 teaspoonful; milk, 4 oz.; water, 4 oz. Boil 15 minutes.

Prune Jelly:

Cover 1 pound of prunes with 1 quart of water, cook slowly. Add sugar to sweeten, and ½ box of gelatin dissolved in a pint of water and boiled. Strain, cool and keep covered.

Gelatin Food:

About 1 teaspoonful of gelatin should be dissolved by boiling in ½ pint of water. Toward the end of the boiling ¼ pint of cow's milk and 1 teaspoonful of arrowroot (made into a paste with cold water) are to be stirred into the solution, and 1 to 2 tablespoonfuls of cream added just at the termination of the cooking. It is then to be moderately sweetened with white sugar, when it is ready for use. The whole preparation should occupy about fifteen minutes.

REFERENCES

1. SMITHIES AND OCHSNER. Cancer of the Stomach, 1916, Saunders & Co., Philadelphia.
2. WILLIAMS. Natural History of Cancer, 1908, New York.
3. HOFFMAN. The Mortality from Cancer Throughout the World, 1916, New York.
4. FENWICK. Cancer and Other Tumors of the Stomach, 1904, London.
5. OSLER AND McCRAE. Cancer of the Stomach, 1900, Philadelphia.

CHAPTER XX

DIET IN DISEASES OF THE PERITONEUM

WILLIAM P. CUNNINGHAM, A.M., M.D.

General Considerations: Commanding Symptoms in Peritonitis.

Diet in Diseases of the Peritoneum: Local Peritonitis; Cancer of the Peritoneum; Tubercular Peritonitis; Chronic Adhesive Peritonitis; Acute Diffuse Peritonitis; Gonorrheal Peritonitis; Acute Peritonitis; Localized Peritonitis; Peritonitis in Children.

GENERAL CONSIDERATIONS

The peritoneum envelops the abdominal viscera in practically their whole extent, and consequently partakes of the pathological developments incident to the many disturbances occurring therein. This participation, under various titles, really constitutes a local peritonitis. We have a perihepatitis associated with diseases of the liver; a perisplenitis associated with congestion of the spleen; perinephritis associated with diseases of the kidney; perityphilitis associated with disease of the appendix vermiformis—in short, every organ with a peritoneal investment imparts thereunto a measure of its own perverted activity. Some of these consequences assume commanding importance overshadowing the original incitation. For instance, ulcer of the stomach if it involves the serous coat, takes on a very different prognostic aspect. Laparotomy may save the patient, but nothing else will. This applies, of course, to ulcer of the duodenum and ileum. Cancer of the stomach or liver reaching the peritoneal shield sweeps on to a greatly accelerated termination.

The pernicious fact of suppurative peritonitis is a grievous commonplace to all of us. The decisive factor in a case of intestinal obstruction is not the damming back of the fecal contents, not the rending of the mucus and muscular coats, but the infection of the peritoneum.

Tubercular peritonitis by a strange pathological contrariety presents a phase of tuberculosis quite amenable to treatment. What quality there

is in the peritoneum practically nullifying the massed assault of this fatal infection, and promptly casting it off on the simple expedient of opening the abdomen, we do not pretend to understand. Usually reacting disastrously to the invasion of other germs, the peritoneum holds the tubercle bacillus at bay and with the slightest assistance puts it to rout.

Commanding Symptom in Peritonitis.—The commanding symptom in all affections of the peritoneum is pain. No matter what has been the course of the disease eventuating in peritonitis, the element of pain becomes obtrusive and insistent the moment this has occurred. This is true of every tissue whose injury is fraught with serious possibilities to the general organism. Pain leads to immobilization, as a natural measure of defense, and consequently a second distinctive symptom appears—constipation. As a corollary, we are confronted with tympanites. While this increases the discomfort, it also serves the purpose of retarding absorption by the lymphatics. Nature attempts in this manner to rescue the patient from the consequences of the original assault. As has frequently been observed, nature is apt to overreach herself. Measures instituted for the preservation of life do not seldom result in its speedier destruction. Tympanites adds so much to the patient's suffering that its relief is urgently demanded. These reflections are entirely pertinent to the matter in hand, since we cannot intelligently proceed to the discussion of any plan of trophotherapy without a comprehensive grasp of all the circumstances that may qualify our decisions.

DIET IN DISEASES OF THE PERITONEUM

Local Peritonitis—**DIET IN LOCAL PERITONITIS.**—The dietary befitting a case of local peritonitis is that befitting the disease of which it is a complication. In a perihepatitis due to an alcoholic, malarial or luetic engorgement of the liver, we should recommend feeding in conformity with the findings. Reasoning that the incapacitated organ is incapable of performing its appointed functions of eliminating toxic accessory material, we must not tax its halting powers too severely. The reduction of the fats and animal nitrogen fulfills the indications.

In due course, conformable to the pathological process at work, we find a shrinking of the organ and a damming back of the venous reflux from the abdomen. Cirrhosis and ascites have supervened. The peritoneum is in a state of subacute inflammation. The diet under these circumstances is to be adjusted as before to the lowered constituents. Raising the blood pressure through indiscriminate imbibition forces from the rad-

icles of the obstructed portal vein an ever-increasing contribution to dropsy.

A regimen with a diuretic tendency (such as lettuce, celery, asparagus, fruit juices, vegetables rich in potassium, and sugar in moderation) is a suggestion in accord with the scientific management of such a case; for the rest, a careful avoidance of the poisonous possibilities of animal protein is required. It may be necessary under given conditions to administer a stimulant. To the objection that alcohol has been the cause of the cirrhosis and that more alcohol will only add to the gravity of the situation, it may be fairly answered that we are not now dealing with the production of cirrhosis, but with the emergencies arising from an established pathological state. We may be forced to act energetically in order to bring the patient out of collapse or up to an endurable feeling of well-being. We have no hope of cure. We are palliating with what skill we possess. It is hardly necessary to assert that, thus encompassed, we may rationally resort to the very element that has been the glutton's bane. The point of view has shifted. We are striving to maintain strength and endurance against a steadily encroaching tide of destruction. Vomiting also is a distressing and prostrating incident which may be controlled by the use of champagne or brandy and ice. It were absurd to decline their valuable assistance.

Cancer of the Peritoneum—DIET IN CANCER OF THE PERITONEUM.—

In cancer of the peritoneum, we must be guided by the general principles underlying the treatment of cancer anywhere. As an extension from other organs or from the mesenteric glands, it is inoperable and must be dealt with by supporting the victim's resistance and relieving pain. A liberal diet, accommodated as far as may be to individual tastes and desires, may accomplish one of these purposes. If it balk the other, an opiate will be in order. For the little while the patient will live, it would be the refinement of cruelty to deny the indulgence of any reasonable craving. Furthermore, arousing in the patient's mind vain expectations of a possible cure along dietary lines that actually weaken his resistance and unduly dull the fleeting months, is a gratuitous aggravation of his already pitiable condition. The assumption that faulty metabolism is the cause of cancer and that it may be cured by a scheme of regulated ingesta, is an arbitrary wresting of the available evidence to an unwarranted conclusion.

The arraignment of surgery as a false evangel, completely baffled by the stupendous problem of ever-growing cancer, babbling impotently of its Apples of Sodom crumbling at the touch, rounds out the plausible argument of the dietotherapeutists. Statistics are the sole dependence of

this engaging cult. If cancer can be shown to be increasing, despite the efforts of the surgeon, "then," says the indictment, "something is back of the disease that the surgeon cannot put his hand on. What can this something be? Undoubtedly a condition peculiar to the localities showing the increased mortality. Such localities are civilized communities. The feature distinguishing such communities from aboriginal or savage tribes is a *diet*. The civilized man eats meat; the savage does not. Therefore, meat eating is the cause of cancer." This refers, however, only to western civilization. Eastern civilization having developed along different dietary lines, is not so infested with cancer. Rice is the staple edible. Swarming populations live upon it. Despite the difficulties attending the collocation of statistics in such crowded, ignorant, prejudiced, and poverty-stricken countries, we are assured that they are decidedly better off than we in the matter of malignant disease.

The pliability of statistics, their amenability to diverse and conflicting constructions, their consequent untrustworthiness unless considered in connection with every possible qualifying circumstance, renders their acceptance as sole and decisive arbiters in any serious dispute an exceedingly dangerous procedure. Admitting that cancer is more prevalent in civilization, admitting that it is increasing its death rate with disquieting persistence, is there no other factor differentiating the savage from his civilized brother except that of food? Are they in all other respects subject to identical influences? Are they so similarly circumstanced that diet offers the only salient on which to hang an hypothesis of their relative liability to malignant degeneration? "Civilization means protein excess; protein excess means cancer." There is a troublesome non-sequitur here hardly to be reconciled by the citation of statistics.

It is true that able names have supported this doctrine of metabolic causation, and its corollary dietetic treatment, but the enthusiasm of the ardent investigator frequently overrides natural prudence and judicial impartiality. The clinical instances adduced in corroboration of the theory, while apparently bearing the stamp of genuineness and validity, unfortunately lack the compelling element of scientific precision. It is indubitable that a discussion of cancer from this standpoint discourages early operation and contributes to the unfavorable surgical results that excite so much criticism.

Tubercular Peritonitis.—Tubercular peritonitis has been already mentioned as responding promptly to the mere opening of the abdomen. The curative effect has been ascribed to the drying of the peritoneum from the action of the air. However this may be, there is no doubt whatever

of the gratifying fact that even in patients with a general tubercular infection the abdominal complication is often completely relieved. This does not hold good for the pleura. Operating for a tubercular pleuritis is detrimental to the chances of recovery. Aspiration is the full measure of surgical interference warranted in that condition. The difference in the behavior of these two serous membranes towards the same surgical operation is one of the oddest phenomena in the domain of pathology.

DIET IN TUBERCULAR PERITONITIS.—Given a case of primary tubercular peritonitis (and in the absence of demonstrable focus elsewhere this must be admitted), if the diagnosis can be established, the diet will be that appropriate to abdominal section, for this step should be taken just as soon as the circumstances will permit. The fruit juices, egg albumin, broth and gruel formula, creating little tendency to flatulence, will supply the patient's needs during the period of repair.

Tubercular peritonitis incidental to a generalized tuberculosis or metastatic focus close or remote, should receive the same attention from the surgeon, if the pulmonary disease will permit the administration of an anesthetic. The diet here must be stiffened as much as possible to maintain an unyielding front to the assault on the system. In operating to remove the abdominal discomfort, we must not overlook the main purpose of prolonging life. Hence our feeding must have in view not only the tiding over of a few days of anorexia with a certain revival of strength at the end, but the holding of the patient to such a pitch of nutritive efficiency as to obviate the progress of the main infection. The process constitutes intensive feeding. Discretion should temper boldness, and boldness whip up discretion. If for sufficient reasons operation is deemed inadvisable, then the diet must be regulated with the purpose of supporting strength and preventing or mitigating pain.

Constipation is not a feature of this form of peritonitis. Diarrhea is likely to supplant it. Meteorism is not characteristic. It may appear, but the abnormal activity of the bowels tells against it. Vomiting, however, is frequent and ruinous. It sweeps away the vitality of the patient by the prostration attending the attacks and the deprivation of necessary nutriment. Pain is variable. It is not as severe as in acute peritonitis. It may be only a sensation of "misery." Occasionally it is absent, or overborne by the acute anguish of some other symptom. A pleuritic pain or that of a tubercular laryngitis will by contrast dull the edge of the subacute abdominal inflammation.

The diet must take cognizance of the diarrhea and vomiting. Both must be controlled. Recumbency, brandy and ice, and indicated medica-

tion may quickly bring the vomiting into subjection. Milk diluted with Vichy, or kumiss and Vichy, will be the first addition advisable. If well tolerated, it may be reinforced with egg albumin. These will not aggravate the diarrhea and as meteorism is not a conspicuous symptom, the tendency of milk to excite it may be ignored. The fruit juices unfortunately stimulate catharsis and are contra-indicated unless their action can be offset by medication. Broths and gruels offer the same objection. The white meat of chicken and vegetables with little residue, and toasted bread, constitute advantageous reserve supplies. Stimulation wisely administered will be of great assistance. Alcohol possesses some nutritive value, as witness the retained muscular strength of the man who has imbibed freely and eaten nothing for a week.

Fats in the form of butter, cream and oil are indicated, if well tolerated. Sugar is an important adjuvant in the maintenance of bodily vigor, and employed in the form of dextrose it is readily absorbed without any incidental intestinal disturbance. The action of sugar and the neutral and alkaline salts in combating the tendency to acidosis should be steadily borne in mind, for many of the threatening symptoms of acute and chronic exhaustion are due to a starvation-acidosis.

When all is said and done, it is indubitable that in the matter of diet-adjustment every man is a law unto himself. Hard and fast rules must yield to idiosyncrasy. I once knew a "bilious" subject whose storms of vomiting would abate upon the supping of cold stewed canned tomatoes! On shipboard, I witnessed the amazing subsidence of a turbulent attack of seasickness in the person of a delicate woman upon her partaking of olives and ice water! The experienced steward was horrified at the suggestion, but she insisted upon the gratification of her "whim" and the event proved that instinct was a better guide than science. Piling Pelion on Ossa, I recall the case of a man whose frequent attacks of "heartburn" induced by eating pastry were invariably cured by eating ice cream soda!

The hackneyed truism "that one man's meat is another man's poison" teaches an important lesson to food-formularists. As far as may be without contravening the positive indications of the diseased condition, the tastes of the patient should be guardedly indulged. The human digestive tract is not a laboratory test tube and many elements of discrepancy may weaken the applicability of the findings in the one to the necessities of the other.

Chronic Adhesive Peritonitis.—Cancer and tuberculosis of the peritoneum constitute two varieties of chronic adhesive peritonitis. There is another of which the origin is often hard to find and which has been

erroneously described upon occasion as idiopathic. Exposure to cold, the kick of a horse, adhesions after operation, and lues have been assigned as causes. It is doubtful if lues is ever etiologic in extra-uterine life, unless by extension from some neighboring organ. Tumors other than tubercle and cancer, such as fibroids and hydatid cysts, are sometimes responsible for its development. Long continued pressure or friction bring about such effects as observed in "corset liver," where the peritoneum is thickened and adherent in the furrow made by the compressing steel stays; as also observed in the thickening produced around the hepatic, splenic and sigmoid flexures in cases of fecal accumulations, and in the thickening and adhesions about old hernial openings.

Leukemia, lymphadenoma and malaria induce a chronic splenitis with adhesions to stomach, intestines and diaphragm. Menstrual anomalies predispose to disease of the genital organs. Catarrhal affections of the vagina, uterus, tubes, and ovaries eventuate in a local adhesive peritonitis. Pyogenic bacteria will convert it into a pelvic abscess.

DIET IN CHRONIC ADHESIVE PERITONITIS.—In all these chronic adhesive forms, the diet is a matter of general principles applied to varied yet similar conditions. If no obstruction is the result of the adhesions there need be no vexatious interference with the usual preference of the patient. Only in the limitation of constipation and meteorism need we be at all concerned. If there are signs of impeded peristalsis, or if pain is a conspicuous feature, the likelihood of stasis must be considered, and the case surrendered to the surgeon. The diet will take the course necessitated by the developments. In pelvic abscess the indication is plain. Operation is demanded as speedily as possible, and the diet is adapted to the exigencies of the situation thus created.

Acute Diffuse Peritonitis.—Acute diffuse peritonitis offers a prognosis of the extremest gravity. Prior to the day of the dauntless abdominal surgeon, it was a sentence of death. Since then a case is occasionally saved by the man who will subordinate his own reputation to the single impulse to save humanity. Laparotomy and the insufflation of oxygen into the abdominal cavity comprise the surgical procedures. Manifestly in a crisis of such feeble promise the energy of the attendant should be directed to sustaining the ebbing vitality of the patient at all hazards. Nothing is to be gained by timorous expectancy. The fight must be carried to the extreme or death is a foregone conclusion.

DIET IN ACUTE DIFFUSE PERITONITIS.—Stimulation is of transcendent importance. We must keep up steam or the vessel will founder. Alcohol is a carbohydrate and promotes nutrition in addition to whipping

up a flagging heart and nervous system. Due consideration must be given to the matter of vomiting. We must make every effort to control it if it has begun and above all we must exhaust our ingenuity to avoid exciting it if fortune has been favorable in this regard. Fruit juices, egg albumin and thin gruels are to be cautiously administered after two days of rectal feeding. Small doses frequently repeated is the keynote to success. If the stomach holds out and there is a glimmer of hope, purée of peas and custard may be added. Enemata of dextrose will combat acidosis and introduce another carbohydrate. Milk is a dubious and debatable proposition. There is no question whatever that it disagrees utterly with some people. With others it agrees perfectly. It is likely to induce flatulence and intensify the patient's agony. Where there has been a lesion of the intestinal tract provocative of the peritonitis, flatulence may prove a serious obstacle to recovery. It is wise as a general thing to defer milk until a later period, unless we have trustworthy information regarding its probable behavior in the case in hand. Chicken broth with toast ground up in a coffee mill may diversify the menu if conditions are reassuring. Beef and mutton broth are better omitted until convalescence because of the liability to disable the emunctories.

If vomiting preclude feeding by the mouth, we must do what we can by way of the rectum. The possibilities of recovery are markedly diminished by the persistence of this symptom. It not only brings about speedy prostration, but is itself an evidence of profound toxemia. To control it, recourse should be had to nutrient enemata. Here we may employ peptonized milk, peptonized egg, and peptonized gruel. Some of the standard predigested foods of the shops may be occasionally substituted. Stimulation is practicable by the same route (*see* Volume III, Chapter XXVI). The rectum will tolerate this invasion for a while, but will certainly rebel before many days. By that time, we hope to have accomplished our purpose. The stomach will have settled or the patient passed beyond human aid. Obviously in cases that cannot be subjected to operation or where operation proves unavailing, the diet is a negligible consideration except in so far as we may aggravate existing distress by injudicious selections. We have no further problem than the easing of the battling forces to an inevitable conclusion.

It is by way of the female genital tract that most of the cases of acute diffuse peritonitis arrive. Septic infection of the uterus and tubes is carried directly to the peritoneum and unless a fortunate array of adhesions fence it about and make of it a local abscess, the disaster is complete. The usual source of this infection is the emptied pregnant

uterus, whither unclean hands or instruments have conveyed the virulent bacteria. Induced abortions furnish most of the examples. Term deliveries furnish a few contributed by the unclean midwife or the borrowed douche pipe. Rectal alimentation may be so painful as to be positively contra-indicated. If vomiting coexist, the condition is hopeless.

Gonorrheal Peritonitis.—The genital tract, male and female, may be the gate of ingress in another variety of septic peritonitis. Gonorrhea via the Fallopian tubes sometimes reaches a locality where it lights up a general inflammation. In the male the epididymis transports the gonococcus from infected seminal vesicles. The proportion of females in this complication is very much larger than that of males, as can be readily understood from a comparison of the relative patency of the two channels of invasion. The end result is the same in this variety of diffuse involvement of the serous membrane except for the hope that may be held out from the action of a gonococcus vaccine.

DIET IN GONORRHEAL PERITONITIS.—The diet should be governed by the broad general principle of getting into the patient the largest amount of easily digested and assimilable nutriment consistent with a judicious supervision of the powers of elimination. There is consequently no essential difference between the problem of feeding here and in otherwise excited inflammations.

Fortunately this diffuse infection is rare. The usual response to the challenge of the gonococcus is the erection of a barrier of adhesions confining the pus to a circumscribed area and diverting the menace into a manageable abscess. This, of course, demands incision and drainage.

DIET IN GONORRHEAL ABSCESS.—The diet should be that appropriate to the operative episode and the term of convalescence. The food with the least residue deserves especial consideration. The prognosis regarding life being favorable the restrictions need not be so rigid. The obviation of flatulence and pain are important for the comfort of the patient and should largely influence our choice. Carelessness as to quality or quantity of ingesta may excite vomiting with a possible rupture of adhesions and the conversion of a local into a general infection.

Acute Peritonitis—**CAUSES OF ACUTE PERITONITIS.**—Septicemia from foci remote from the peritoneum may attack this membrane as violently as a virulent local contact. This is rare but has to be taken into account. It is quite possible for an ulcerative endocarditis to send an infective embolus racing through the circulation to a final lodgment in the mesenteric artery. Thence the destructive process will quickly reach the peritoneum. Infection of the spermatic or umbilical veins working its way

up through the portal system will come to the same destination. It is remarkable how seldom acute general infective diseases are complicated by peritonitis. Pneumonia is practically never thus accompanied, although pneumococci are found in the peritoneal exudate. Pneumococci may be a cause of peritonitis, but only exceptionally as a concomitant of pneumonia. Typhoid fever by the perforation of an ileal ulcer is capable of producing a fatal peritonitis, but rarely through the systemic dyscrasia. The exanthemata, while ready enough to assail the pleura or endocardium, seem powerless against the peritoneum. Erysipelas furnishes an occasional deviation from this rule. Acute articular rheumatism, quick to lame the heart, does not touch the analogous tissue in the abdomen.

It would appear that the peritoneum is endowed with defensive qualities enabling it to fend off most attacks on its integrity launched from the blood stream. It generally requires the actual deposition of infective agents on its surface, the spread of infection by contiguity of tissue, the touch of fire to inflammable tow, to start the destructive process. Down through the diaphragm will work a pleuritis or an abscess of the lung. The movement changes its title when it crosses the diaphragm just as those great city thoroughfares which bear different names north and south of an intersecting road. It now becomes peritonitis, but it is really a continuity of the morbid condition above.

Gynecological operations in inexpert hands have resulted in peritonitis. This is something that rarely obtains to-day. In certain combinations of circumstances, as for instance, in the extension of infection from the pleura to the peritoneum, the pericardium may also be involved. The lymphatics are the avenues of communication. This is known as polyserositis.

Chronic nephritis has been saddled with the production of peritonitis. The relationship has probably been that of a weakened resistance to pathogenic bacteria. Purulent nephritis and pyelitis are directly concerned, however. The perforation of an appendicular abscess or an appendix with gangrenous walls often proves fatal through the failure of nature to set up a protective barrier. This is happily occurring with decreasing frequency, owing to the more intelligent supervision exercised by the physician.

Hepatic abscess may cause acute peritonitis. Hydatid cysts may rupture and produce as serious damage. Mesenteric and retroperitoneal glands may cause general and purulent peritonitis, if they are infected from any focus within the range of their distribution. Chronic adhesive inflammation may arise from the same source. Inflammation and suppu-

ration of the abdominal walls may take the lymphatic route to the peritoneum. Purulent omphalitis is in this category and offers the additional risk of involvement of the umbilical vein. The burrowing of a psoas abscess, caries of the ribs, vertebræ and pelvic bones, abscess of the upper part of the rectum, are all potential factors in any given case. Cholelithiasis may eventuate in pericholic abscess and this in purulent peritonitis. Gall stones and catarrhal cholecystitis conduce to chronic adhesive peritonitis which forms adhesions to colon, duodenum and stomach. These may lead to kinking, acute obstruction, strangulation and septic peritonitis.

DIET IN ACUTE PERITONITIS.—In the acute forms of peritonitis, the diet as we have seen is really that essential to the convalescence from abdominal operation. Laparotomy is the road along which hope is struggling, and the diet conforms to the exigencies of the situation.

Overwrought emunctories straining to rid the system of the pathological elements multiplying with disconcerting rapidity, must be scrutinized with unwavering diligence, and no aliment administered that is calculated to add to their embarrassment. The broths from animal foods must be omitted until the examination of the urine affords substantial encouragement. The imminence or the prevalence of acidosis demands the counteracting influence of fruit juices and the alkaline and neutral salts. Dextrose, too, is important in this regard. The salts and the dextrose may be given by enema. This phase of the morbid activity is not sufficiently emphasized. It is acidosis that blocks the kidney by the edema that follows the lessened alkalinity of the tissues. It is acidosis that blocks the circulation by the accumulation of carbonic acid in the venous system. Acidosis waterlogs the liver and greatly interferes with the destruction of toxins conveyed there by the laboring portal vein. This same great causeway is jammed with effete material that cannot push through the congested organ, and the peritoneal inflammation is consequently much intensified. The back door drainage, so to speak, effected by the surgeon is offset by this frontal obstruction. The circulatory and lymphatic systems cannot free themselves of their incubus if the terminals are clogged with impassable edema. The nitrogenized ingesta have a tendency to increase this difficulty of elimination. Hence the wisdom of withholding them until the sewage is flowing freely and the percentage of irritating ingredients is decidedly reduced. Diacetic acid suggests, and excessive ammonia indicates, the presence of a dangerous acidosis tending to cripple the eliminative function. Indicanuria due to putrefactive changes in the intestinal contents is another warning of the evil of a nitrogenized diet.

These indications of imminent calamity should be acted on promptly and vigorously.

Localized Peritonitis—DIET IN LOCALIZED PERITONITIS.—Localized peritonitis may be acute or chronic. It has already been briefly alluded to in summarizing the principles underlying the nutritive problems of peritonitis in general. It was postulated that in perihepatitis, aside from the pain of the serositis, the management of the case is identical with the management of the original disease. Edibles prejudicial to the welfare of the liver are interdicted. Fats are hard to digest without the emulsifying action of the bile. Therefore, they ought to form a very small part of the aliment in conditions where this agent is deficient.

The proteins after digestion by the enzymes of the intestines are absorbed into the portal circulation, and carried to the liver, there to undergo recasting or reconstruction to adapt them to the purposes of ultimate metabolism. We are not quite certain as to the alteration there effected, but we are positive that it is an essential preliminary to the final disposition of the proteoses, peptones and amino-acids. The disabling of such a necessary organ must allow the imperfectly converted protein elements to reach the tissue cells utterly unfit for normal anabolism. Toxic effects are certain to result.

The incomplete conversion of protein is a serious danger to the human organism. So it would appear rational to limit the animal protein in the dietary of such a patient. The liver also dehydrates much of the sugar received from the intestinal tract and converts it into glycogen for the use of the cells when their supply begins to run short. The liver, therefore, acts as a sort of regulator or reservoir of the excess output. This is doled out to the blood upon demand from the tissues. This function is bound to suffer from shrinkage of the liver parenchyma, but it seems to be attended with less untoward consequences than the failure of the other; so that the reason for the restriction of the diet in perihepatitis becomes perfectly clear. To be sure, some of the impaired function may be retained, and ventures may be made in a cautious fashion to give the proteins and fats.

DIET IN GALL STONES.—Gall stones have been discussed as the possible cause of suppurative peritonitis. They are more commonly the cause of a chronic adhesive peritonitis of limited extent. Here the giving of nutriment is governed by the circumstance of cholemia—obstruction and pain. Fats are prohibited. The liver embarrassed only by the retention of bile (which is greatly relieved by absorption into the blood stream) is capable of performing much of its peculiar function, and,

therefore, albumin and starch may be given in moderation. Flatulence is troublesome where the bile is deficient and this must be corrected by medication. Frequent evacuations of the bowels will increase discomfort without giving any material compensation, since the clay colored stools reveal the fact that bile does not leave the system by that road.

If the cholangitis has subsided and the duct is patulous again and the local peritonitis is the only feature demanding our attention, the diet may be as liberal and varied as the pain will permit. Activity in the stomach and duodenum will stir up resentment in the encompassing peritoneum. The feedings had better be small, frequent, and liquid till this inflammation is under control. Aside from this there are no restrictions.

DIET IN DIAPHRAGMATIC PERITONITIS.—Diaphragmatic peritonitis or subphrenic abscess may be due to an extension downward of a pleuritic process, but is oftener due to a perforative lesion in an adjoining abdominal organ. The treatment being surgical the diet follows the course prescribed after abdominal operations. If it is due to a perforation of a hollow viscus this circumstance would influence the manner of introducing sustenance. The rectal route would be that of necessity for a few days at least. Movements of stomach or small intestine would magnify the pain and the chances of disaster. Complete rest would obviate pain and permit the unimpeded march of repair.

The nutritive enemata should always be peptonized, as the system will not take up elements except in the form of proteoses, dextrose or saponified fats. To expect raw eggs or milk to be absorbed from a portion of the bowel unprovided with enzymes is preposterous.

The digestive ferments are for the purpose of rendering food fit for absorption. If unessential, nature would not have been guilty of the prodigality of providing them. Writers will tell of throwing unconverted pabula into the waste pipe of the digestive tract, as though digestion were not an indispensable accessory to metabolism, and composedly assume the absorption of such raw material as casein, egg albumin, and flour. Whatever of nutritive value is obtained in this extravagant way is due to the absorption of water and emulsified fats. It is drawing the long bow with a vengeance to suggest the assimilation of protein and carbohydrates under such circumstances. It is admitted that patients lose weight on rectal alimentation. It is quite obvious why, if they are nourished on water and oil.

DIET IN ACUTE AND CHRONIC PANCREATITIS.—Acute and chronic pancreatitis may involve the peritoneal covering. It is hardly necessary to state that the gravest importance attaches to the withdrawal of the

pancreatic ferments in whole or in part from the process of digestion. Inflammatory and suppurative affections of this enormous gland, the blocking of its secretion by gall stones and tumors, and catarrhal swelling of the duodenal membrane, constitute a dangerous assault upon the life of the individual. The situation must be met promptly and fearlessly or inanition will be rapid and portentous. It is fortunate that we possess in the glands of the sheep a temporary and sufficient substitute for the digestive agents thus urgently demanded. Pancreatizing or peptonizing the selected foods relieves the system of the impossible task of doing this for itself. The repulsive taste and odor accompanying this conversion renders the articles unfit for administration by the mouth. They must be introduced by the rectum. Dextrose may be advantageously included in the menu. This mode of procedure is demanded also by the pain excited by peristalsis in the neighborhood of the affected organ. If operation is performed, the reasons for avoiding oral feeding are multiplied.

DIET IN NON-PURULENT APPENDICITIS.—In the non-purulent cases of appendicitis, the diet consists of bland and easily digested ingredients calculated to carry the patient through a few days of enforced inactivity. Fruit juices are always in order. Clear soups and thin gruels with white of egg, custards and purées of peas and spinach, may be utilized as circumstances demand. Milk with its unfortunate tendency to induce meteorism is best deferred until the case is out of the problem stage, and then it will not be needed. Those who can assure us that milk has never created any disturbance may be indulged cautiously, if they are clamorous for their favorite beverage.

DIET IN PURULENT APPENDICITIS.—In the purulent form of appendicitis with a walled off abscess cavity, the general condition of the patient will be worse than in the preceding form, and the question of feeding is a little more difficult. Vomiting must be avoided or ruptured adhesions will speedily transform the picture into one of hopeless collapse. Here it will be advisable to let the stomach alone until two days have elapsed and depend on the Murphy drip to supply nutriment and fluid (*see* Volume III, Chapter XXVI). The composition of the instillation will be half an ounce of dextrose and a dram of bicarbonate of soda to the pint. Here we are not only relieving thirst and supplying sustenance and preventing vomiting, but we are forestalling the occurrence of acidosis.

If the stomach is dilated, it may be washed out with a bicarbonate of soda solution and an ounce of milk of magnesia left behind. This procedure is of problematical utility, if it produces gastric revolt. If the bowels are opened by the retained magnesia, weak tea, chicken broth, egg

albumin, fruit juices, gruels, custard and purées may be guardedly administered. This manner of management holds good for any case of abdominal section, where there has not been perforation of a hollow viscus in its continuity. The appendix may be considered a side issue where the action of the bowel in peristalsis and evacuation is not so prejudicial to repair.

DIET IN ULCER.—In graver involvement of the digestive tract, as in the perforation of a gastric or duodenal ulcer, where the operation performed depends for its successful issue on immobility of the sutured area and its freedom from irritating contact—the rectal alimentation must needs be prolonged. If necessary, intravenous injection of chlorid of sodium solution may be given. Subcutaneous infusions of the same and of oil (the oft-neglected method of hypodermoclysis), may be of great temporary advantage and may tide the patient over a tight place. The nutritive value of the oil thus introduced may be slight, but at any rate the salt solution will support the circulation and keep the kidneys busy. Reasonably a peritonitis diffuse or limited, not associated with the perforation of any part of the digestive tract, does not call for such a rigid exclusion of nutriment by way of the stomach. Even at the expense of some additional pain, the feeding of the patient may be thus attempted after the immediate disturbance of the operation has somewhat subsided.

If there is no perforation to tear open and no sutures to displace, peristalsis is relatively important only in its excitation of pain. The question to be decided is whether this consideration overweighs that of the maintenance of strength. Individual judgment must render the verdict in each individual case. Without strength the patient will die, despite the control of peristalsis; with strength the patient can survive even the anguish of peristalsis. Medicine may be invoked to mitigate the keenness of this symptom.

As a broad general proposition it would appear advisable to utilize the natural manner of introducing food in the best interests of the patient. Better assimilation, better blood, more stamina, greater resistance to bacterial attacks, quicker repair of damaged tissues, are the concatenation of advantages incident to natural ingestion.

Peritonitis in Children.—Children react to infective invasion of the peritoneum just as promptly as adults. The opportunities are fewer, but the results are the same. For instance, gonorrhea is obviously much more likely to be a factor in a woman than in a child; yet gonorrhea has been transmitted to children by careless nurses, with subsequent peritoneal involvement. Pyogenic organisms have freer access via the parturient

than the infantile uterus. Appendicitis is frequent and the consequences graver in children, because of the feebler resistance of the peritoneum against septic infection. Tubercular peritonitis is a complication of hip joint disease, vertebral caries, or caseous glands. Pulmonary tuberculosis being relatively uncommon in children is not a notable cause of peritonitis. Many cases of streptococcus infection have been reported, in which no contributory focus could be discovered. Trauma has appeared to be operative on well authenticated occasions.

DIET IN INFECTIOUS PERITONITIS OF CHILDREN.—The problem of feeding is precisely that of the adult case with the modifications necessitated by differences in age. In children old enough to be on a mixed diet, nothing but the scaling down of quantities is demanded. In very young children the milk question will have to be met and answered in a more conservative manner than in older ones. The tendency to flatulence is not so marked in tubercular peritonitis as it is in other forms. Diarrhea is rather frequent. Milk, therefore, is not so dubious an element of nutrition. In septic and traumatic inflammations, the sustenance of the very young should be continued and milk is an indispensable constituent. It may be omitted right after operation, and fruit juices, egg albumin and gruels depended on for a while, but resort to animal broths is precluded by the immaturity of the emunctories, and milk should be resumed as soon as prudence permits.

A wealth of detail is sometimes expended on the inculcation of an idea which would seem to be easy of expression in a few short sentences. But it is a failing of the human mind that the application of principles is often thwarted by a variation in the terms of the proposition. Therefore, in the interests of clarity, it is expedient to put the case in every aspect likely to appear, and to adjust our working formula thereunto. It would be perfectly simple to say "there are only about a dozen articles of diet which can be used in peritonitis. Adapt them to the changing manifestations of the disease. Fruit juice, egg albumin, gruel, broth, dextrose, custard, purées of peas and spinach, junket, tea and zwieback comprise the summary. For rectal use, peptonized milk, eggs, gruel, and dextrose will suffice." But on every shifting of the site of trouble, doubt arises as to the applicability of an existing regimen, and the need of something special for a recent case. Thus it is that the recital grows. One writer has said very truly that the diet in peritonitis "merely demands the use of ordinary intelligence." This is an epitome of the whole theme. Within certain limitations every case is a law unto itself. Rational interpretation of symptoms and rational adaptation of our resources to the

conditions revealed, is a practical and trustworthy guide to dieting in diseases of the peritoneum.

BIBLIOGRAPHY

ALLBUTT and ROLLESTON. System of Medicine.

BAINBRIDGE, WILLIAM SEAMAN. The Cancer Problem.

BLOODGOOD, J. C. Prog. Med., 1903.

CORNER, EDRED M. In Gen. Med. and Surgery, Latham and English's System of Treatment.

KEEN. Surgery.

LATHAM, A. Latham and English's System of Treatment.

MAYO-ROBSON. *Ibid.*

NOTHNAGEL, PROF. HERMAN. Diseases of the Intestines and Peritoneum.

PESSAVY, H. Maladies du Péritoine.

SYMS, PARKER. Peritoneal Tuberculosis, Ann. Surg., May, 1903.

CHAPTER XXI

DIET IN MENTAL DISORDERS

TOM A. WILLIAMS, M.B., C.M. (Edin.)

General Considerations: Diet in Relation to Growth and Consequent Mental Disorders.

Various Clinical Types of Insanity in Relation to Diet; Confusional States; Periodic Depressions and Excitements, Cyclothymic and Maniacal Depressive Psychoses; Recurrent Mania from Gluttony; Marked Confusion Due to Metabolic Migraine Resembling Petit Mal; Confusion Vertigo-Hypertension; Epilepsy and Stupor with Organic Changes; Melancholia; Metabolic Psychasthenia; Acidosis and the Brain; Alkalinosis.

Psychological Factors Concerned in Diet: Sitophobia; Sitomania or Morbid Desire for Food.

GENERAL CONSIDERATIONS

The sensitiveness of the cerebral mechanism to chemical disturbance is familiar to everyone who has seen the immediate effects of anesthetics, of morphin, of alcohol. Its sensitiveness to bacterial poisons is familiar in the delirium of the infectious diseases. These are both acute situations and easily observed. The errors of metabolism which disturb brain chemistry are more insidious, produce less marked effects, which are less easy to connect with the causative agent. Hence it is only since the recent arousal of interest in the pathological chemistry of internal medicine that much attention is being given to them.

Among these disturbances those created by improper diet seem to the writer of great importance. The clinical investigation of the subject is rendered difficult by the quality of idiosyncrasy; for the old saying "one man's meat is another man's poison" is nowhere more applicable than where the nervous system is concerned. For instance, a sympatheticotonic person is rapidly poisoned by a small dose of belladonna, from which a vagotonic person derives a state of well-being; a bilioneurotic tempera-

ment is thrown into a state of inappetence and depression by a dose of alcohol which merely renders a sanguine or lymphatic temperament expansive for a short while; a tachycardia and tremor may be induced in a person of neurotic type by a quantity of tea or coffee which will cause a loosening of thought and a sense of well-being in the pure lymphatic; differences in susceptibility to anesthetics are well known to every surgeon. Pharmacological instances might be adduced in great number. Regarding foods, the same principle seems to play a part, in accordance with the metabolic capacities of each person. Some of these we can even now relate to particular functions of the body. For instance, the extreme carbohydrate tolerance of hypopituitary persons, the steatorrhea of certain forms of dysthyroidism, and, of course, the well-known carbohydrate intolerance of pancreatic inadequacy.

Data regarding the effect of particular foods upon the nervous system are still scant; and it is rather by a collection and analysis of facts bearing upon the problem collaterally, that we shall be able to infer the rôle of diet in psychiatry.

Diet in Relation to Growth and Consequent Mental Disorders.—That starvation of the embryo or infant retards the growth of the nervous system was proved by H. H. Donaldson(1) through feeding experiments on rats. This, of course, consists of the deprivation of adequate protein, for none of the other constituents of food are concerned with protoplasmic growth except in an accessory rôle.

Furthermore, particular constituents, amino-acids, are necessary for growth, as Mendel and Osborne(2) have shown. Thus grains poor in tryptophan do not permit animals to grow; hence the need of supplementing an exclusively corn or rice diet in stock feeding. The meaning of this is that for the building up or the rebuilding from waste of the protein molecule, it is necessary to have each constituent amino-acid in the food.

That deficiency of some of these must lead to cerebral inanition and consequent mental inadequacy, is to be inferred. That this consequence is not frequent may be due to such facts as, first a tremendous reserve of cerebrum, which is seldom required to furnish all the energy of which it is capable. Second, this requirement most often concerns persons whose diet is not deficient in variety of protein. Third, the instinct which seeks rest when exertion is demanded under improper conditions. This is well observed in underfed school children, who are inattentive and lazy also when the studies are interesting, or even at play. An exception exists, perhaps, in the brilliant minded, poorly nourished child in whom, perhaps, there is a seizure by the nervous tissues of the available protein,

which is thus stolen from the supporting structures, the glands and the muscles. The fourth fact unfavorable to cerebral depletion is the very general variety of diet which popular custom has established; so that it is very unusual for people who are not poverty stricken to suffer from deprivation of adequately varied protein.

Again, the absence of considerable weight loss in the nervous system during starvation must be in part due to a power of seizing upon the amino-acids in the protein molecule in the serum albumin and globulin of the lymph; for it is scarcely to be supposed that neural protoplasm differs from other protoplasm to such a degree as to show no wastage. An additional argument against an inherent difference lies in the fact that the heart too scarcely loses weight during starvation, although there must be considerable wastage during the work of a contractile organ.

PROTEIN POISONING.—Most of the substances unfavorably affecting the cerebrum are nitrogenous bodies, and many of them are derivatives of proteins. Furthermore, proteins themselves are so constituted that until elaborated by the digestive glands they are powerful poisons. This is particularly due to a slight change of the hydrogen-ion content, as Vaughan(3) has shown.

Furthermore, either alkalinosiis or acidosis favors an edema of the tissues; sometimes so intense as to be discernible by the naked eye or by palpation. A histological edema must necessarily escape detection (unless it is sufficiently extensive to increase the patient's weight) except by the functional disturbance it induces. It can be attributed to edema only by inference.

PROTEOSE INTOXICATION.—Some new data are available concerning the chemistry of cellular disturbances by alimentary toxins. That diseased conditions occur because of protein catabolism has been disputed by some clinicians who believe that bacterial toxins are responsible in all cases. This has been definitely disproved by Whipple(4), who has produced a proteose toxicosis by perfectly sterile intestinal loop occlusions, and also by injecting sterile bile into the pancreatic duct, while he demonstrated a toxic proteose in the sterile peritonitis produced by turpentine, aleuronat, bile. This proteosis, especially that caused by acute intestinal obstruction, is accompanied by great increase of the non-coagulable blood nitrogen which may rise to 200 mg. per 100 c.c.

When proteose is injected into a normal dog, this blood nitrogen may rise within three or four hours to 60 mg. It has nothing to do with renal inadequacy, but must be due to breakdown of the body proteins, as it occurs during starvation and is accompanied by an enormous increase of

nitrogen elimination by the kidney, over 100 per cent, which may last even for five days after a single small dose of proteose intravenously; furthermore, the increase does not begin until the second day. The same effects are produced by closing a loop of intestine or by producing peritonitis, pancreatitis, pleurisy, or a sterile abscess. The intravenous experiment proves, however, that the increased nitrogen is not due to what occurs at a site of inflammation, but is a general increased protein catabolism due to the absorption of toxic proteose.

No anaphylactic reactions, precipitins or complement fixations are produced by these proteoses, and no immunity to their action is acquired by the blood; whereas the tissues of injected animals acquire such immunity, which, moreover, can be conferred by heterogeneous proteose; furthermore, a long continued intestinal loop or obstruction permits an animal to survive a lethal dose with few symptoms. The same immunity is induced by a sterile pleurisy or peritonitis.

Pancreatic and tissue ferments, and intestinal mucosa, do not digest the proteose. This proteose is that which is precipitated by 5 vol. of 95 per cent alcohol or by half saturation of ammonium sulphate. 100 mg. may kill a 15 pound dog.

Comparable with the toxicosis of the proteose is that produced by the protein poison of Victor Vaughan(5), which is still more lethal: although the symptoms are the same. Both physiologically and chemically, these resemble the actions of peptone poison. Vaughan, therefore, thinks that the responsible body is either identical or closely related in all three. He presents the conclusions of Pryer(6):

1. All protein contains a poisonous group which is identical or closely similar in action.
2. From one gram of casein enough of this poison can be obtained to kill 800 guinea-pigs when injected intravenously.
3. The protein poison is not beta-imidazolyl-ethylamin or histamin, although the physiologic effects of the two are very similar.
4. The poison is not a cholin derivation.
5. The poison is a protein cleavage product, acid in reaction, capable of forming compounds and reacting much like the globulins in its behavior to neutral salts.

Levin(7) has shown that the protein poison combines with Witte's peptone, egg white and other proteins, both in vitro and in vivo, and in doing so the action of this poison on animals is modified and partially neutralized.

The findings of Emerson and Chambers(8) are as follows: The proteins and their fragments give the biuret test. The poisons give this

test in much higher dilutions than the residues. This indicates that the proteins and their fragments contain acid amid groups and other substituted amid groups and that the products have not been deamidized in the cleavage.

The proteins and their split products give the xanthoprotein test, the poisons in higher dilution than the original proteins and the residues, indicating that all contain benzin nuclei, and in the cleavage these nuclei are concentrated in the poisonous part.

The original proteins and the poisonous fragments give the Millon test, the latter in higher dilutions than the former, while the residues do not give this test, thus indicating that all the monohydroxybenzin nuclei are concentrated in the poisonous protein in the cleavage.

The original proteins and the poisonous fragments give the Bardach test, while the residues do not. According to the accepted idea, this indicates that the residues should not be classed as proteins.

The proteins and the residues give the Molish test, while the poisons do not, indicating that all the carbohydrate group is concentrated in the residue in the cleavage.

Proteins and both fragments give the Adamkiewicz test, but the color produced with the poisons is uniform whatever the source of the poison and different from that given by the residue. This test is usually considered as indicating the presence of tyrosin, which is concentrated in the poisonous protein.

In a second communication, Emerson and Chambers(8) report on the relative responses of the proteins and the split products to the ninhydrin test. Their conclusions are as follows:

The proteins respond to this test in dilutions up to 1:10,000. The poisons are equally responsive to the test. The residues fail in dilutions of 1:100.

It has been found that when a drop of an aqueous solution of the protein poison is placed on the skin and scratched in with some blunt instrument, a well-marked local reaction develops within a few minutes. Local tumefaction accompanied by itching results. The possible relation of this to the hives and to the urticaria of serum disease suggests itself. Compare Eustis' well-known experiment in which he incriminates histarium.

We find also that the substances resembling the protein poisons can be extracted from normal tissues. The resemblance of these bodies to the protein poisons are both chemical and physiologic. They have been obtained from brain, heart, lungs, spleen, liver, stomach and intestinal walls, kidneys, and most abundantly from voluntary muscle. In small

doses, they cause typical anaphylactic shock and death with the usual post-mortem findings. Should it prove that such bodies are normal metabolic products, the protein poisons will become more interesting.

Vaughan considers that the protein molecule is a salt of base and acid, the acid being the toxin. It is in this way he explains the antagonistic effect of calcium in protein poisoning. The application of this explanation to Fischer's work on acidosis might be fruitful. That nephritis may be due to protein toxicosis of the renal epithelium Longscope's work indicates. That these may be food products rather than bacterial toxins is believed by Vaughan. It is also believed by him and others that foreign proteins are eliminated into the alimentary canal and may produce local ulceration. The old observation that duodenal ulcer occurs after burns as well as after application of arsenic to an abraded surface is most significant.

The toxic substance of the protein seems to be masked by the rest of it. These can be separated even in the test tube, as Vaughan has shown. It does not seem to be the toxic substance which produces antibodies. So far they are only produced by unsplit protein. Efforts are being made to produce antigen without toxic consequences. Gay has found that the leaching of a poisonous substance out of typhoid bacilli leaves a residue with greater immunizing power than the whole substance.

Part of the immunizing power of organisms is seated in the products of internal secretion. For instance, thyroidectomised dogs will die in convulsions in a few hours after being fed on flesh, while they will live for weeks on bread and milk. The explanation that hyperthyroidism is in reality a conservative reaction against protein intoxication, whether bacillary or not, is a contention to be thought of in the adjudication of its etiology.

It has long been known that the liver prevents protein poisoning. The symptoms brought on when the liver is shut out can be relieved by calcium, which can even prevent the convulsions which occur when meat is fed to such dogs. In this respect the condition resembles parathyroid tetany. The vagatonia of this condition is of the same order as the syndrome of anaphylaxis. Nausea, incontinence of feces and urine, bronchial spasm with urticaria, low blood pressure, are all pneumogastric symptoms.

Sensitization is perhaps due to a sudden setting free of toxic substance through the splitting of the foreign protein by an immunizing enzyme, whether innate or acquired. The result is the toxicosis known clinically as the positive reaction. These are sympatheticotonic signs for the most

part, tachycardia, fever, chill, gastro-intestinal inhibition, dilated pupil, nervous excitement.

FOOD AS A SOURCE OF ANTIGEN.—The dependence of resistance to infection upon the quality of the food has received the empirical belief of clinicians for centuries, and more especially regarding tuberculosis the importance of a high protein dietary has been emphasized in our own day. It was not until recently, however, that any suspicion regarding a specific substance was aroused where the production of immunity was concerned. The writer, in 1903, in a study of the climatic factors in the cure of tuberculosis, presented arguments to show the relationship of immunizing or anti-bacterial organismal potency to the assimilability of proteins(10).

Recent work seems to show, however, that concerning antigen the source may be specific; for, in experimental anaphylaxis, nucleo-protein B, *i.e.*, that extracted with boiling water, has an efficaciousness not present in simple proteins or nucleo-protein(11).

Nucleo-protein B is abundant, however, in all the common cereals. It is possibly the antineuritic substance in the pericarp which prevents and cures beriberi.

The researches of McGregor(12) show that in the central nervous system occurs an extremely labile protein very sensitive to slight changes in acidity or alkalinity. This may be the nucleo-protein found in McGregor's research. This substance contains iron; it is only one of the individual proteins found by W. Koch, the others being neurokeratin and various individual proteins. Of the latter there is one soluble in distilled water precipitated progressively by increasing concentration of sodium sulphate and fractionally by heat; it is very unstable, breaks down in weak acids into at least three products varying with the acidity and the medium. It contains about 11 per cent of phosphorus, it gives a slight reaction to the tests for iron, it is about 5 per cent of the dry brain.

The protein soluble in dilute alkali is present in the amount of 10 per cent; it contains 6 per cent of phosphorus, its precipitate is unchanged by acid, it also contains iron.

McGregor believes that the central nervous system contains neither Halliburton's globulin nor A. Marie's acid meta-protein.

Now we know that inadequately metabolized nitrogenous substances play a large part in the pathological state of nephritics(13). The relation of the amount of these substances in the blood and the amount of protein in the diet is very clear, even taking into consideration the derivation of part of the pathological blood-nitrogen from the normal breakdown of tissue.

A very significant fact in this connection is the discovery that in every one of 100 consecutive autopsies on the insane, Southard and Canyvan(14) found deteriorated kidneys. Furthermore, the relation of nitrogen retention to mental confusion appears important from a study by F. E. Williams, who found in many such cases an increase of urea and non-protein nitrogen in blood and spinal fluid, a retention of nitrogenous substances, poorly functioning kidneys, with the urinary findings of interstitial nephritis. In these patients, alkali failed to produce the normal responses. Therapeutically, a low protein diet has proved effective in confusional cases.

CARBOHYDRATE AND FAT EXCESS.—It has been claimed that excess of fat may lead to mental disturbances. Mercier has presented a number of cases in support of this, and he believes that F. Hare(15) has established the connection, more especially where headache and confusion are concerned. Some of the conspicuous symptoms in Mercier's series were a dazed and muddled feeling, confusion of mind, depression, screaming fits and motiveless weeping and laughing, defects of memory, hallucinations of sight and hearing.

It is to be noted that the symptoms due to excess of carbohydrate and fat are worse in the morning and clear up towards evening. I append one of his cases cured by increasing the meat intake. Many of his cases improved when butter was restricted and meat increased.

A widow, aged 70, complained of pain in the head, giddiness, sleeplessness, shocking dreams. Between sleeping and waking she had visions of murdering people. She lived chiefly on milk puddings and a little fish with meat once a week, fish twice, and but very little of either. She did not get to sleep till between three and four, then slept only for two or three hours.

Treatment.—Told to eat meat every day, and a large ration. In a week she had increased her sleep to four to five hours. In a fortnight she lost her visions. In three weeks she was sleeping well and did not dream. In four weeks she was sleeping ten to twelve hours, but still suffered from pain in the head. In seven weeks she lost her headache, slept well and did not dream. Volunteered the statement that she was better than she had been for three years(16).

XANTHIN POISONING.—It is, however, to be noted that many of Mercier's cases, which occurred in the English poor attending the dispensary for mental disorders at Charing Cross Hospital, consumed large quantities of tea. Among the poor of England tea is taken very strong and steeped for a long time. Consequently its tannin content is very

high; hence the proteins of the diet are rendered insoluble. Mercier does not state in his article that he rectified this vice of his patients; but it is not likely that he failed to do so. Perhaps then we may attribute the disappearance of the psychasthenic state of his patients, in part at least, to the diminution of the their intake, and in part to a better digestion on account of abstention from tannin, as well as to the greater assimilability of the proteins in the diet they were taking, in addition to the factor Mercier adduced, viz., the lessening of the fat and carbohydrate intake and the increased amount of protein in the form of meat.

That xanthin bodies can produce psychasthenic symptoms in certain individuals, is well authenticated. I have observed a United States Congressman in whom one cup of strong coffee will produce a state of extreme agitation, both mental and physical, so that he trembles violently, stammers over his words and cannot think connectedly.

FORCED FEEDING.—When food is absolutely refused by the patient, the question of proper alimentation becomes one of the highest importance in order to tide over an emergency and support life until confusional insanity or delirium subsides. The refusal to partake of food is one of the most annoying conditions met with, but is quite common among the depressed insane. If prolonged, it frequently has a serious influence upon the health of the patient.

Where a patient in good physical condition refuses food, it is just as well to let him go without for a day or two, in the hope that the cravings of hunger will impel him to eat. Usually, when artificial feeding is once begun, it will in all probability have to be continued. No ill effects are to be expected if a strong vigorous person is permitted to go without food for three or four days. However, it frequently happens that when the patient is first seen, he has been temporized with so long, that it is imperative to administer nourishment without delay. There are many methods of administering aliment to such patients, but the method of tube feeding is the only one that merits much attention. These patients may be successfully fed by either the nasal or esophageal route.

The esophageal route is the method of election. The patient should be placed in a stout, solidly built straight-backed arm-chair. If the patient is very feeble, the dorsal decubitus will be preferable. With the patient in the sitting position, the operator stands behind and gently forces a soft wooden wedge between the teeth on the left side of the patient's mouth; grasping the head with the left hand and arm, the operator can firmly fix it while nurses or assistants forcibly secure the patient's feet and legs. When all is ready, the esophageal tube is dipped in the

milk to be given and gently inserted into the gullet. A funnel is now attached to the free end of the tube, and the milk, soup, or other liquid food is then poured into the funnel by an assistant.

In feeding by the nasal route, the same position is assumed for passing the nasal tube. Before attempting to pass the tube, the nose should be carefully examined for deflected septum or polypi, always using the side which will present the least obstruction. The tube when ready is dipped in the milk to be administered and gently passed along the floor of the nostril back into the esophagus, care being taken that it does not enter the larynx. If such an error be made, the operator will soon find his patient showing the usual signs of strangling, coughing and cyanosis, and will notice at the same time a gurgling sound of air rushing along the tube as it passes in and out with the respirations. It is well to remember that in some of these cases, particularly in paresis, there is more or less anesthesia of the larynx; the signs described above may be in a large measure absent. In order to be on the safe side, it is therefore advisable to wait a few moments to satisfy oneself that the patient is not respiring through the tube, without forgetting that even when the tube reaches the esophagus a little rush of gas may escape from the stomach through the distal end of the tube. When satisfied that the tube has reached the esophagus, the physician may introduce the food by pouring it into the funnel and allowing it by force of gravity to flow into the stomach as with the esophageal tube. Owing to the small caliber of the nasal tube, waiting for the effect of gravity is a slow process, so that to save time, an ordinary Davidson syringe may be attached to the tube, first filling it with milk to exclude the air, and then gradually compressing the bulb. This will shorten the duration of the feeding.

In withdrawing the tube, be sure to pinch it tightly to prevent leakage into the larynx. The nasal route is preferable where the patient fights and resists the operator, but is contra-indicated in cases with nasal disease or obstruction. The esophageal tube likewise should be avoided where there is disease of the esophagus or a very feeble heart, and especially where the nasal tube can be passed with less difficulty.

The usual mixture for nasal or esophageal feeding is:

Milk.	1½ pints.	660 grams.	504 calories
Eggs.	2.	100 "	160 * "
			<hr/> 664 "

Beef juice or other forms of liquid food may be added. These feedings should be given at least three times in the twenty-four hours.

For forced alimentation, it is necessary to administer food in fluid form, and a quart of milk with a couple of eggs, either raw or slightly cooked or made into an eggnog, may be given three times a day. Nutritious meat broths thickened with barley, rice, or vermicelli, and strained, or potato purée, or a purée made of beans or peas, may also be given through the larger tube. Patients can be fed in this manner with the greatest benefit. Dr. H. C. Wood of Philadelphia successfully fed a patient—6 pints of milk and 16 raw eggs daily for a period of six weeks. An ounce of malt extract may advantageously be added to the potato, oatmeal, bean or pea gruel, since this method of feeding does not permit the commingling of saliva with the aliment, and the malt extract, by exerting a diastatic action on the mass, will aid the process of digestion and slightly liquify the gruel, thereby aiding in its rapid passage through the tube.

Suralimentation has been recommended when feasible, in acute delirious mania, in melancholia with frenzy, and in some of the maniacal seizures incident to the aged, where the great importance of a liberal allowance of milk, eggs and animal broths, cannot be overestimated. If patients will ingest food, it should be abundantly provided, such as tender meats, custards, jellies, cereals with cream, eggnog, thickened broths, purées, beef jelly, and gruels. These should all be made palatable and attractive, and food should be given every three hours. By diverting the blood current and nervous energy requisite for the digestive process, the general nervous system and mental condition become soothed and quieted. The insane should be carefully watched while eating as they often bolt their food when given too much at a time. Such patients should have their food prepared in a fine state of subdivision, or in a fluid or semi-fluid form. Patients with advanced general paresis or partial paralysis of any of the muscles of deglutition, might easily suffocate by getting a piece of food in the larynx. Patients with mania gravis or suicidal melancholia should not be allowed the use of knife and fork, or plates which are easily broken into sharp fragments with which to cut themselves.

ALCOHOL IN RELATION TO MENTAL DISORDERS—*Cerebral Edema*.—The wet brain of alcoholism does not seem to differ either in appearance from and may be approximated pathogenetically to the edematous brain of uremia. That it has nothing to do with back-pressure or failing circulation is indicated by its relative absence during increased intracranial tension due to hydrocephalus from tumors or other mechanical obstruction. It is only when the chemistry is perverted that edema occurs.

Whether the chemical disturbance is always an acidosis, as Fischer supposes, or whether the acid state is merely the effect of a protein poison, is still unsettled. The observations in favor of Fischer's view are abundant and cogent. The matter must be settled by experimental physiologists and internists, upon whose findings psychiatrists will have to rest their theory and practice regarding this question.

Endogenous Toxins in the Pathology of Alcoholics.—That alcohol in itself does not produce the pathological changes in the nervous system which occur as result of its prolonged ingestion is probable from the fact that changes indistinguishable from these occur from various poisonous agents chemical and bacterial. Edema of the brain has just been mentioned. Polyneuritis also has many other causes besides alcohol. Many pathologists, more especially in France (Charrin) and Italy believe that tissue degenerations such as polyneuritis and cerebral sclerosis are the consequence of the damage to the liver created by the alcohol, interference with hepatic metabolism preventing the proper elaboration of toxic food-protein by the liver, and that the by-products thus set free are the effective poisons in alcoholism. This seems to be the case in acute hepatic atrophy and in poisoning by phosphorus or arsenic.

Among many peoples, alcohol is a constant adjuvant to the dietary. The French workingman cannot be persuaded that he will have the strength to do his work unless he takes his liter of wine at his midday and evening meals; just as the Italian workingman believes that garlic gives him strength to labor.

While it is quite true that the rôle of alcohol in the induction of permanent mental disturbances has been greatly exaggerated by over-zealous and hypercritical observers, yet there are instances where severe disturbances of considerable duration are produced by relatively small doses. This is not only true of the cerebrum, but of the nervous system in general. Thus Babinski has reported a case where a persistent very painful polyneuritis did not subside until the patient was deprived of the liter of very weak wine which he took each day.

One of the peculiarities of the class known in France as *dégénéré* and described in American text-books as constitutional psychopaths is their susceptibility to comparatively slight disturbing causes. Thus a mild infection, a moral shock such as a disappointment, or some ordeal like a court trial, may cause a loss of mental balance. For the most part, such individuals are much disturbed by alcohol and often exhibit unsocial behavior after very slight doses. But that such a tendency is not necessarily a stigma of inferiority is shown by the large number of highly

educated superior individuals who are easily disturbed by alcohol. The striking instance subjoined is that of a man who has been for many years a successful manager of a very large industrial concern, and who exhibited no psychopathic stigmata whatever. Yet, a few days of rather copious whiskey drinking caused an acute confusional delirium which lasted over a month and led certain alienists to believe he had paresis.

This patient had hallucinations following unconsciousness, after drinking sporadically for about eight days. He later developed delusions of persecution and could not be restrained. When this had lasted nearly a month, dementia paralytica was suspected. A history of rheumatism with shooting pains and spasms in the legs, a girdle sensation, and treatment at Hot Springs, was a suspicious feature of the case. Transient diplopia was still more suspicious, as were recurrent headache and loss of weight. On examination, he showed active deep reflexes, diminished cutaneous reflexes, speech slow, slurring, and sometimes reduplicated, gross defects in the calculation tests, but only an occasional sign of confusion otherwise, or irregular behavior. The walk was swaying, but there was no definite ataxia; there was slight intention tremor of right hand. A lumbar puncture was made and the fluid found normal, lymphocyte count being 2 per c.m., which excluded paresis. He was taken to a sanatorium, given a simple easily digested dietary, with enforced rest, and treated without violence. He was able to leave in two weeks almost completely recovered, feeling clear in the head, able to perform the calculation tests, and having a good memory. Since he left the sanatorium, he has remained well for six years.

VARIOUS CLINICAL TYPES OF INSANITY IN RELATION TO DIET

In clinical medicine, we have long ago passed the stage where we are content with a descriptive name for a series of symptoms. This no longer satisfies the studious careful internist. We are not content until we interpret the rationale of the syndrome and trace out the process responsible for each symptom, reaching if possible the ultimate cause; for we realize that only in this way can remedial measures be most efficaciously applied.

It is, of course, now well recognized that insanity is a mere term of sociological convenience, and not a disease of single causation. Hence, there can be no single treatment of any insane person. Not even of any of the very various manifestations shown by patients of unsound mind can there be a single treatment. For instance, of mania there are many

types and different causes; thus maniacal behavior occurs in alcoholic hallucinosis, in typhoid delirium, in circular and periodic psychoses, in paretic dementia, in catatonic excitement, in paranoid conditions. These states are pathologically different; and for the most part must be reached by different therapeutics.

Again, what the older writers called melancholia shows itself in chronic alcoholism, in the result of some infections, in the depressed phase of periodic and circular psychosis, in catatonic depression, in certain phases of paretic dementia and in the constitutional psychoses under provocation. And yet no single agency is responsible for the melancholia, and no single treatment applicable. So of any of the symptoms indicating disorder of the mind, all need interpretations in terms of their pathogenesis before treatment is instituted. This is simply the method of all clinical medicine, which no longer talks of the treatment of heart disease, of albuminuria, of catarrh, of rheumatism, but finds out the process which is occurring and endeavors to meet it, if it cannot find and eliminate the cause.

Hence, in this chapter the obsolete classification of the insanities into mania, melancholia, primary and secondary dementia hallucinosis, delusional insanity, will be ignored. Attention will be confined to the physiopathological states where the metabolism is concerned, in so far as dietetic factors are of importance.

Confusional States.—Ever since Chaslin, clinicians have recognized a vast group of mental derangements of which the central feature was confusion. They have recognized, too, that a toxicosis is responsible for the symptoms even when these are of an active type and show themselves as excitement and hallucination, for beneath them all is the same kind of impairment of mental function which, when extreme, produces stupor.

The syndrome is best known in delirium tremens, and in febrile delirium, for in each of these it is readily seen that a single pathogen is responsible for varied symptoms. It has not been so evident that disturbances of the metabolism themselves may produce confusion of mind; but the experimental work concerning beriberi and pellagra points in that direction.

Short of these extreme cases, there is perhaps not yet clinical proof that dietetic disturbances cause grave impairment of mental efficiency; but there is strong presumption that mild degrees of mental disturbances are due to dietetic errors. The thesis, however, cannot as yet be completely stated; and I can only, therefore, subjoin a number of instances where the dietetic factor seemed to be the paramount one in the induction

of such disturbances as confusion, epilepsy, melancholia, psychasthenia and mania.

Periodic Depressions and Excitements, Cyclothymic and Maniacal Depressive Psychoses.—The lack of more extensive data regarding the dietetic factor in these cases is regrettable; for the rôle of diet as the exciting cause and the means of cure in the subjoined case are most impressive.

Recurrent Mania from Gluttony.—The wife of a clergyman was seen at the York Retreat during my residence there in 1907. For several years she had recurrent attacks of excitement with rise of temperature, rapid pulse, disorderly acts, filthy ways, obscene language. These would occur at the menstrual period, not oftener than every month, and sometimes less frequently. Preceding and during the attack the leucocytes in the blood were greatly increased. On one occasion 37,000 to the cubic millimetre were found. During the subsidence of the attack, in about ten days, the count would be normal. Between the attacks, the patient might be regarded as normal, although her disposition was somewhat selfish and unreliable. No cause for her attacks had been discovered. Two years before, the patient had been placed upon a strictly vegetarian diet, without any benefit, for in the prescription of the diet the principles embodied in this article had not been duly considered.

In the search for a cause, I one day minutely questioned a nurse concerning the habits of this patient, who on account of the freedom given her between attacks, was not under continuous observation by anyone. I was told that she spent her afternoons in passing from one pavilion to another, taking tea in rotation with the nurses. On each occasion she would eat abundantly of what was on the table, and this would go on most of the afternoon. Moreover, she would spend all her money on sweetmeats, and often on more substantial things, which she would eat during the morning, seldom offering any to another person.

From these data, I theorized that her maniacal attacks were the expression of the outburst of accumulated toxicosis, due to her gluttonous habits. They were precipitated by the toxic wave of the menstrual period; but they did not occur every month, because during the maniacal attacks the patient was practically starved, and insufficient time elapsed before the next menstruation to allow of sufficient accumulation to produce toxicosis.

Whether these were secondary effects of bacterial action, the defense against which was broken down by the excess of food, whether they were purely biochemical in mechanism, we did not determine, for we were primarily concerned with practical therapeutics.

It was formerly thought the leucocytes indicated bacterial invasion, but experiments prove that it is an indication merely of protein intoxication, for a leucocytosis as high as 40,000 may be induced by the injection of nucleins as well as by various bacterial toxins without the introduction of live organisms at all.

The result fulfilled the expectations of the theory, for when the patient's indulgence was prevented the attacks ceased; she returned home, and my latest advice was that she remained well some years after.

Marked Confusion Due to Metabolic Migraine Resembling Petit Mal.—

A bacteriologist aged thirty, was referred, because of attacks he called "bilious" (but not preceded or accompanied by constipation), which produced headache, preceded by numbness and pricking in the fingers, followed by dizziness, mental confusion, and foolish talk of paraphasic type, without loss of consciousness. These attacks had occurred every two or three months since the age of twenty-two; they were of very short duration; there were no scotomata, but the attacks were formerly accompanied by vomiting. The headache was of the splitting kind, lasted all day, and was followed by dullness and slowness of thought the following day. The capacity to concentrate his thoughts was increasingly impaired even between the attacks. He was at times irritable. He had no bad habits, and, apart from these attacks, he was well and strong. As a boy he had received a blow on the left side of the head, and there was still a dent in the left parietal region, upon which side the headache more often occurred. He had a large appetite, which he said he controlled, but he ate meat three times a day, although, he said, sparingly. The blood pressure was not raised, and reflexes and sensibility were normal. He was given the low protein "standard" diet and has remained well to date, now over three years.

Confusion Vertigo—Hypertension.—A man, aged fifty-seven, complained of dizziness, trembling on walking, torpor and confusion. These symptoms had first occurred on his graduation, and again fifteen years before I saw him. On each occasion he recovered by means of physical labor on a farm. They have occurred from time to time since. Being advised that they might be due to an error of refraction, he saw Dr. Wilmer, who gave him prism exercises without benefit. The vertigo so alarmed him that latterly he never went out unaccompanied. Intercostal neuralgia had troubled him, especially when tired; and troublesome constipation caused him to take purgatives daily. The physician who sent him to me had recommended a course of baths, but these did not remove the symptoms,

which, however, were always relieved by a hot bath and by whiskey. He was a very hearty eater and an excessive smoker.

Examination showed only some exaggeration of the deep reflexes, failure of the right plantar, abdominal and cremasteric cutaneous reflexes. The motility was normal, except for a slight lack of firmness in the gait. Sensibility was normal, and the pupils reacted and converged well. The heart sounds were clear, the second being somewhat accentuated. The systolic blood pressure, which a year before had been 190, had been reduced, under the care of the physician who referred him, to 160 when I examined him. He exuded an unpleasant odor of sour tobacco. Physically he felt dull as a rule, readily falling into a dull sleep, but worried much and felt very restless at times, especially after exertion.

The diagnosis was toxicotic hypertension. The prognosis was good. The treatment consisted of the limitation of tobacco to three cigars a day, cure of the constipation by special diet, removal of the toxic condition by this special diet aided by a course of baths to favor cutaneous action, and exercise in moderation to increase metabolism.

As a result, by April 18th the systolic blood pressure was 130, and he was rarely dizzy. The favorable result, however, caused him to exceed dietetically once or twice, so by April 25 several dizzy attacks had occurred. The blood pressure, however, was only 124 the day I saw him. The instructions were emphasized, so that by June 2, with blood pressure 122, there had been no vertigo. On June 23, blood pressure 124, constipation induced vertigo again; and it occurred once more on July 11 as a result of over-smoking (blood pressure was only 120 when I saw him). His complexion had improved, his eye became clearer, the accentuation of the second cardiac sound had disappeared, and he was able to perform his duties like a normal person. Thanks to his intelligent and earnest wife, who sees to his diet, this patient remains well, in May, 1917, even through-out a period when his wife was severely ill.

Epilepsy and Stupor with Organic Changes.—A man of sixty-four, chief architect in the Indian Service, was sent to his physician because of the recent occurrence of epileptiform convulsions with loss of consciousness.

The first attack had occurred in May, 1909, at an elevation of twelve thousand feet, near Durango, while he was inspecting the school buildings there. He was unconscious for half an hour. The second attack occurred shortly after, upon leaving the train in Chicago, while making for the staircase. It lasted about an hour. A third attack took place that July in his office, lasting about one and a half hours. The fourth

and last had occurred two nights before his visit to me, while he was visiting a friend and sitting down. It lasted three hours.

The attacks are preceded by a creeping sensation in the left upper arm, passing slowly down to the hand, which becomes numb. In about fifteen minutes unconsciousness supervenes. The face is said to be flushed, but he is uncertain whether there are convulsions, though others have told him that there are. The duration of the attacks was only surmised.

Previous History.—Scarlet fever at six, without bad sequelæ. An active living, healthy man, except for two years of asthma twenty-five years before, a result of constant attacks of catarrh. It was cured by working as a farmhand for three weeks. He smoked two cigars and a pipe once a day. He took coffee, and was a heavy drinker, until after the attack; now he has ceased to take even tea. He has always been abstemious in eating, but has been fond of salty foods. He drank "when he felt like it." Since these attacks he has had a pain over the forehead when coryza occurred.

As he has read that insanity might come on from this catarrh, he was at first a little anxious about his state but soon steeled himself against it. The pain in the head was rather a feeling of depression and a grumbling pain, like that of catarrh. The discharge was slight, and when it ceased the headache disappeared. He used to sleep quite well, but about the time of his attacks began waking in the early morning, and could not fall asleep again. This persisted. He had been advised to eat more and to take fat meat, and this recommendation had been followed.

Physical Examination.—Reflexes—Knee kick, R.L. Achilles reflex, R.L. Triceps, L.R. Radicals equal. None markedly exaggerated. Plantar reflex is flexor. The left cremaster is absent.

Sensibility.—No abnormality in lower limbs to pain, touch, temperature nor attitudes, though the latter are sometimes wrongly named, but correctly recognized. Arms, perfect localization of light touches both segmentally and axially. Spacing sense of fingers normal. Other modalities normal except sense of attitudes poor, especially in the left hand. No hemiopia or color inversion of visual fields.

Motility.—Normal, but left fingers weaker than right. Diadokokinesis regular. Pupils contract promptly.

Psychic Functions.—He thinks his memory is weakened since the attacks. There are no disorders of speech. Emotionally, he has always been easily excited when there was a cause, and has been accustomed to occasional sadness.

Diagnosis.—The localization of the aura in the left arm and hand, along with the increase of the triceps reflex and the loss of the cremasteric, point to an organic perturbation of the sensory-motor area of the right hemisphere, probably mainly in or near the cortex of the central fissure, opposite the second frontal convolution. The cremaster governing fibers are, of course, attacked in some other situation.

As neoplasm and granuloma were each unlikely, and as the man's age is that of arteriosclerosis, of the state preceding which the recently acquired matutinal insomnia was indicative, I believed it wise, although lacking proof, to adopt the supposition of sclerogenetic toxicosis, and put it to the experimental proof of therapeutics. Accordingly, a diet light in proteins was ordered, and coffee and tobacco were forbidden. The result was confirmatory, as the patient, one year from the consultation, remains free from attacks and insomnia, and is perfectly well able to perform his very strenuous work, often in high altitudes.

I believe that the first attack was inaugurated in consequence of an ischemia of a part of the right Rolandic region, due to the heart, strained by the high altitude, not being able to keep full of blood a partially sclerosed vessel distributed to that area. The second attack was likewise due to a sudden demand upon the heart upon leaving the train after a very hot journey.

Melancholia.—The following patient, a physician of sixty-eight, came under observation after a year's grief and worry. He slept badly, had paresthesia in his hands, feet, and hearing organs. He took narcotics in increasing amounts. He lost weight and power of endurance. His optimism was replaced by dullness or distress, by turns; and he wept much over his griefs. No objective changes of reactions of nervous system were revealed by examination. The tension was 160 mm., but proteogenetic toxicosis was diagnosed from the matutinal nature of the insomnia, the paræsthesiæ without sensory changes, and the loss of endurance. A diet low in proteins and purins led to disappearance of unpleasant symptoms. He remained well three years later.

Metabolic Psychasthenia.—An engineer of thirty-eight, formerly accustomed to active work, had been for months unable to concentrate upon the office work to which he had confined himself for over three months. Previous to this he had been much less active, and latterly he had been very much worried by an official inquiry into a contract for which he had been mainly responsible. For no cause known to him, he is torpid mentally, cannot concentrate, feels a dread in the mornings, and an indecision

in business matters, as now realized to have been present several months. There was no syphilis, nor any other organic disease.

He had been improved by three weeks in the woods, during which he was very somnolent, but relapsed at once upon return, and could hardly stand his morning suffering. There was no insomnia.

Physical Examination.—The reflexes were rather active, but there was no other objective change in the lower neurones; there was no amnesia; the sexual hygiene was normal. He was much depressed, and longed to go away from it all for a year, which he could well afford to do.

Treatment.—He was sent for three weeks into the mountains. This time he fully recovered, on account of the light diet which he took. Breakfast and supper were fruit and milk, and his midday dinner was vegetables and six ounces of meat; after a few days, cereals were added morning and night.

SEVERE PSYCHASTHENIA IN A CHILD AGED TWO YEARS.—A girl aged two; nursed at the breast until two months old; fed on condensed milk until six months old; fed on cow's milk and water until eighteen months old, then allowed to take any food she wished.

Since the age of three months, her mother has given her coffee at the same strength as taken by the family, and she now drinks three large cups a day; the rest of her diet consists of one-third of a glass of prepared cereal in the morning, and during the day she nibbles about one slice of bread and butter, and eats a small piece of potato at midday for dinner. She will eat neither egg, fish nor meat, and she refuses vegetables and fruits. Since the age of six months, however, she has been fond of eating plaster and earth.

Two months before she was seen she had begun to scratch her wrist during a great part of the day and had produced a deep raw sore there, which still persists. For several weeks she has screamed all day long, and seemed in great distress. During the night she wakes suddenly and jumps up, and her sleep is restless and disturbed.

On examination, the fontanels were found open, there was a slight rosary and the radial epiphyses were enlarged. The nutrition was poor, the deep reflexes were exaggerated, the tint was sallow, the intelligence was not accessible at the examination. In spite of her apparent excitement she seemed emotionally indifferent and was not perturbed by the examination. But she screamed at the top of her voice nearly all the time and appeared to be in acute distress. There was no local tenderness to account for this, and both sensibility and motility appeared normal. Dr. Donnally, who was kind enough to let me see the case at the clinic

of Dr. Wall of the Children's Hospital, could find no disease of a medical or surgical nature other than indicated by the symptoms afore mentioned. The sphincters were under control.

The psychasthenia of this case was clearly shown since the age of six months. The eating of plaster and earth is the consequence of a psychological state—the feeling of inadequacy. This results in the desire for a satisfaction to terminate it. Everyone must be familiar with the feeling which even a superficial self-analysis calls “below par.” With more or less intelligence, the adult adopts the relief of food and drink, tobacco, distraction, excitement and what not. By these means he may abolish, or forget for a time, the feeling which often passes of itself in a cyclical manner. But when the longing is the expression of a constant physical dyscrasia, as in the case of this child, it is apt to be more continuous and insistent. This was clearly manifested in her by the erosion of the flesh which she maintained on her wrist. The impulse which determined this is clearly evidenced by a parallel case quoted by Janet.

The screaming of this child, too, was merely another expression of general discomfort, of psychasthenic depression wearing the guise of excitement. The malnutrition which prevented closure of the fontanel and produced a physical dyscrasia was responsible for the psychic state. There is little doubt that the lack of appetite was a result of the psychasthenic state rather than its cause, and that the latter was in the first place produced by the intoxication of the caffein imbibed constantly since the age of three months.

Again I quote a parallel case of a woman to whom had been prescribed three grains of caffein each day. After eight months of frequent attacks of “angoisse,” she stopped the caffein, whereupon the attacks ceased. When she resumed the drug, the attacks recurred; and she relapsed again and again until, finally, she omitted the caffein. When one remembers that this is only the quantity contained in one and a half cups of coffee of average size and strength, or in about three cups of tea, a frequent insidious cause of nervous depression is strikingly revealed.

The experimental work of Kraepelin has shown very clearly the progressive inaccuracy of the motor functions in persons under the influence of tea or coffee. The laity do not realize that the cocoa bean also contains a xanthine body, theobromin, so cocoa and chocolate must be incriminated as potentially injurious in this way to certain individuals.

Acidosis and the Brain.—It must be remembered that acidosis occurs in starvation by the breakdown of the body protein and lipoids. Hence, the calorie intake must be kept up. In the diet there should pre-

ponderate carbohydrates for heat forming purposes, and richly basic substances to antagonize the acid formed by the proteins. These are found in fruits containing citrates or malates, and in vegetables, which usually contain large amounts of alkaline earths as well as alkalies proper.

It is very important to keep in mind that not all vegetable acid salts leave an alkaline residue in the blood through oxidation of the acid component. This is only true for such salts as those of citric and malic acid. In the case of tartaric acid, in which grapes and unripe fruits are rich, oxidation does not occur, and the ingestum is excreted as such, remaining acid while in the body. Indeed, deleterious effects on the kidney have been reported from feeding tartrates. To these calcium is an antidote, as it prevents the toxic effects of the acid-producing tartrate of magnesium.

When acidosis is severe, mouth ingestion must be supplemented by intrarectal or even intravenous introduction. The latter is preferable to begin with, when there has been long starvation or vomiting. Pure and sterilized dextrose should be slowly injected into a vein in a concentrated solution of 45 per cent in sterile distilled water. Not less than thirty minutes should be taken to inject 100 c.c. Otherwise the dextrose will be excreted renally before oxidation.

When necessary alkali should be injected also. In urgent cases, the intravenous route should be used, but rapid absorption is possible per rectum. Fischer recommends for either route a solution of the following composition: sodium chlorid 14 grains, sodium carbonate ($\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$) 10 grains, distilled water up to 1,000 c.c. It should be introduced slowly into the vein or by the drip method per rectum.

It is instructive to study a case of mild and unsuspected acidosis, which caused such intense mental disturbance that the patient, a large rugged doctor who stated that he did not know the meaning of nerves and had no sympathy with "neurotic" patients, yet believed that he was losing his mind. An improper post-operative diet had caused the condition, which was quickly removed by the giving of carbohydrates.

PSYCHASTHENIC STATE FROM ACIDOSIS.—A Washington physician after an appendectomy manifested persistent anxiety as to his recovery, and could not be disabused of the conviction that his renal functions were impaired, that cardio-vascular disease was impending, and finally, that he was losing his mind and would be permanently incapacitated for carrying on his work. His physicians regarded his state as hysterical, and tried to change his mental attitude by chaffing him and endeavoring to cheer him up, but their efforts were unavailing. The patient was agitated

and yet rather ashamed of his emotional weakness, which he tried to laugh away, without, however, attempting to minimize how dreadful he felt. He had scarcely slept for several nights. His pulse rate which had once descended to 82, had remounted to over 100, and the respirations were 22, sometimes being as high as 26 per minute.

There was no infection to account for his condition, as the wound had healed promptly, except for one small stitch abscess, and the rise of temperature was inconsiderable, as it had steadily fallen since the operation from 102 to 98.8. There was restlessness, throbbing around the heart, lightness of the head, marked insomnia, nausea.

I considered that nothing indicated the case to be psychogenetic and that a physical cause must be sought. As nothing objective except tachycardia and high blood pressure and neural irritability were apparent, and as there was no indication of hyperthyroidism, and the blood pressure had not previously been elevated, I sought for the causes in the post-operative and pre-operative conditions.

All these conditions perturb metabolism, cause toxicosis, and predispose to an acid state. The acid state interferes with cellular metabolism and may even cause cloudy swelling. The functions of the noble elements are impaired; thus muscles, glands and central nervous system are in disorder.

I suspected that we were dealing with an acidosis, in spite of the absence of acetone bodies in the urine. To confirm this inference the alveolar air carbon dioxid tension was measured. It was found distinctly subnormal, being only 28.4 mil. mercury. No other tests were made in this mild case, but treatment was instituted forthwith.

Therapeutics consisted of carbohydrate diet, cornstarch drink during the night, sugar water, puffed rice, and later oatmeal for breakfast, with abundance of vegetables and fruit at midday, as well as the general diet of the hospital. Thirty grams of sodium bicarbonate was also given every four hours. The carbon dioxid tension in five days had risen to 32.9. As a result, the patient improved within two days and within a week was no longer upset by fears; he went to Atlantic City and he returned completely well in ten days.

Alkalinosis.—The condition of the nervous system found in tetany, although it is known to occur upon deprivation of the parathyroid gland, has not received adequate explanation. McCallum and Voegtlin's investigations of the calcium deficiency have received much attention, but a recent remarkable study of Wilson, Sterne and Janney(17) shows that the symptoms of experimental tetany in dogs are enormously relieved by

injections of mineral acids. These experimenters infer the possibility that tetany may be due to a hyperalkalosis.

Regarding this, the observations of Bryant should be considered. He has attempted to show that human beings may be divided into two chemical types, herbivora and carnivora. The relations of these to the power of dealing with acid-forming substances or alkaline bases have to be worked out. It is significant that when very large rations of precipitated milk salines, which are very rich in alkaline bases, were added to a standardized diet fed to rats, the effects upon both growth and reproduction were bad, and that even when they were young convulsions and early death occurred.

PSYCHOLOGICAL FACTORS CONCERNED IN DIET

Sitophobia.—Many of the obsessions and milder manias of the mentally disturbed are concerned with food. For instance, in mental anorexia, the psychological incapacity or refusal to eat may be so insistent that the victim may starve to death. This condition is usually regarded as analogous to the stereotyped mannerisms shown in dementia precox. It is not a common eventuality, but patients suffering from extreme anorexia may for years starve themselves so as almost to become living skeletons. One young woman in Déjerine's clinic had for months eaten daily only half an egg, one lemon and two biscuits.

The cause of this reluctance to eat is usually a notion of female patients that eating will keep her normally fleshy. This she objects to on the score that it is a pandering to the body. Of this she is ashamed because it is carnal, and therefore evil, whereas she believes that she should seek to attain the good, which is the spiritual.

In most people with this notion, the call of appetite is stronger than principle, and they succumb to the temptation of eating, stilling their conscience by some specious excuse, or becoming convinced of their error and changing their principles. Indeed, it is by changing the point of view of the patient regarding food and eating that the physician accomplishes the cure of mental anorexia.

Unfortunately it has been the custom when a patient complains of inability to digest certain articles of food—and when the doctor finds that the gastric secretion is not deficient, and that the contents of the stomach pass through the pylorus without undue delay—to resort to the diagnosis of nervous dyspepsia or indigestion, although pain and flatulence may be complained of as well.

The notion in the physician's mind is usually very vague, as is shown by the nature of the treatment; for among the drugs exhibited in such cases, the commonest are strychnin, which is given for its supposed action as a nerve tonic, bromids in order to quiet the nerves, aromatics, especially valerian, which are still more vaguely supposed to influence the nervous system in an "antispasmodic" manner. If the doctor believes himself "more advanced," he may use hydrotherapy in the form of cold douches, believing that in some occult way, it will give "tone" to a nervous system with which the doctor confesses himself non-conversant, but which will be restored to efficient action if stirred up by this means. Or if his bent has turned towards psychotherapy, or physiological therapeutics, as it is termed, he may meet mystery with mystery by applying electricity to one or more or all parts of his patient, perhaps concealing the empiricism which is his real guide under a number of theories and terms of pretentious and portentous ponderosity.

The survival of such anachronistic absurdities must surely indicate that they possess at least some merit, and this will appear as the pathogenesis of the state benefited is considered. The practical empiricism which leads its adherents to believe the doctrines of each of these various means of therapy has eventuated, in extra-professional circles, in such doctrines as those of Christian Science, healing waters, pools and relies, the efficacy of which is well established in certain cases, although the doctrines on which they generally depend need not here even be discussed, so much at variance are their foundations with all that we know of biology.

In general one does not hear much of the failures which accrue to each of the foregoing methods of treatment. As a matter of fact, by spending some years in trying one of these means after another, most cases eventually recover, perhaps spontaneously during a period when they are trying no treatment at all, "they just get well."

Now, it is inconceivable that a neuronie paralysers, such as the bromids, can by its pharmacological action abolish the same perversion of neural activities as would be accomplished by strychnin, which on the contrary is a powerful excitant, to the lower neurones, at least. Of the anti-spasmodics, the effect is more local and reflex, and is strictly temporary, and more often than not entirely without permanent benefit in nervous indigestion, as the histories in a neurologist's case-book clearly show.

Indeed, in many cases, the gamut has been run through drugs, hydrotherapy, electricity, restrictions and modifications of diet, and even change of habits of life and occupation, without any benefit, and actually

with progressive emaciation, asthenia and "nervousness," by which term the patient describes an inadequacy for the manifold reactions required in the adjustment to the innumerable exigencies of daily life, personal, social and professional.

The supposed cause, a direct disorder of the nerves regulating the secretions and movement of the viscera, the sympathetic or autonomic nervous system, cannot be incriminated. Though our knowledge of the functions of this system in health and disease is still imperfect, we do know some conditions in which it is perturbed; *e.g.*, the gastric crises in locomotor ataxia are caused by the implication of the sympathetic nerve fibers in the spinal roots, en route to the rami-communicantes. They are not spared by the chronic meningeal inflammation which by compressing the radicular nerves and blocking some of the nerve fibers produces the incapacity to control the muscles which is determined by the failure of nerve impulses to reach the higher nerve centers which regulate movement.

But the gastric "neuroses" present a very different picture to this, and are curable by a very different procedure, for they have nothing to do with the autonomic nervous system, except in so far as they are influenced cerebros핀ally in the way demonstrated by Pavlov.

It may be recollected that in dogs Pavlov determined at will the flow of gastric and salivary secretions, not only by giving a dog flesh to eat, but first by merely showing the flesh which the dog expected to have, and later by the mere ringing of a bell which the dog recognized by previous experience as a signal for a meal. But not only that, for he could inhibit secretion by inducing fear, as by showing a whip to a dog who had experienced its use.

PSYCHIC EFFECTS ON THE DIGESTIVE ORGANS.—The motor efficiency of the stomach is shown by the experiments of Cannon to be much more easily and gravely impaired by unpleasant emotions than even psychologists had suspected. For instance, peristalsis entirely ceased for fifteen minutes after one of his cats had been disturbed, although she showed her agitation only by a slight swishing of the tail and was quietly sitting on Cannon's knee. He also reports the case of a woman who, to the surprise of her physician, showed one hour after a test-meal, not only no digestion and no acid, but remains of the supper of the night before. Suspecting something unusual, the physician fortunately repeated the test the following morning, when abundant acid and good digestion were found. The patient confessed that she had been much agitated on the first night by her husband, who had employed his visit to town in becoming intoxicated. These facts show the great importance of prescribing

test-meals under conditions favorable to good digestion. Otherwise serious misinterpretations occur as to the patient's digestive power.

Cade and Latarget have performed similar experiments on human beings, and have found contrary to the case of Pavlov's dogs that the withholding of an appetizing morsel does not stimulate a flow of gastric juice, but often arrests it. The principle is not destroyed, however, for the arrest in human beings is due to the overpowering of the anticipated pleasure by the irritable temper induced by withholding the morsel. I have noticed subjectively a similar effect from too long waiting between courses at dinner when very hungry.

Cannon used respiratory distress as the inhibitory agent in his experiments, and proved that this acted through the nervous system, and not through asphyxia, because it had no effect when both vagus and splanchnics are cut, after which motion too is lost. When the vagus is cut, the stomach movements can on the contrary be impaired emotionally and by checking respiration.

These reactions are called psychic, because they are not due to a direct stimulus of a simple system of lower neurones, instinct in their disposition, which we call a reflex, but to a complicated series of reactions modifiable at will by environment and dependent upon acquired memories of sensory experience which are associated into what we call ideas. Thus the idea of the approaching meal caused gastric secretion; the idea of the whip caused fear which inhibited gastric secretion.

Now, exactly the same mechanism is at play in human beings, and the number of associational stimuli which they possess is incomparably greater. Everyone knows the simple watering of the mouth when palatable food is thought of during hunger. Most people now realize how the appetite fails and even the mouth becomes dry if they attempt to eat during distressing circumstances, but it is not so clearly realized that a slow fear, worry, or a spirit of unrest and hurry similarly interfere with digestive secretions by preventing the enjoyment which Pavlov discovered to be the most important essential in starting the flow of digestive fluids (*see* Volume II, Chapter IV, Hygiene of Eating).

But a much commoner source of the apprehension is an idea derived from others that a particular article may disagree. Food faddists are as loquacious as numerous, and a constant bombardment with pessimistic phrases about the indigestibility of anything from bananas to beef will inevitably create in most people a feeling of discomfort when such an article is placed before them. Doubt prevents enjoyment, and the juice does not flow.

A still commoner source of pernicious ideas as to one's digestive powers is the saying by the laity, "Everyone has indigestion at one time or another"; many consult doctors for this, and most patients are suggestible to a certain extent. The authority of the physician makes his words impressive in a way he does not always realize. His conviction expressed, if not by words at least by his giving drugs for the stomach, is a strong reinforcement to the patient's belief that this organ is diseased, and as his drugs tend to modify the gastric secretions, they only perpetuate the gastric discomfort instead of removing it. In fact, the physician's whole attitude is one huge "suggestion" that the stomach is the primary seat of the trouble.

Now the production of a symptom by suggestion, if it is also removable by the same means, brings it within the category of hysteria, as defined by Babinski(18) and fully explained by the writer(19). For modern diagnostic acumen has eliminated from the *olla podrida* in which was thrown every incomprehensible nervous symptom: (a) cases of trickery simulation and mythomania; (b) modifications of the tendon, cutaneous and pupillary reflexes; (c) vaso-motor and trophic neuroses, such as erythromelalgia, idiopathic edema, etc.; (d) other psycho-neurotic states, like psychasthenia, the main symptoms of which are the emotional and intellectual besetments so distressing to the patient; (e) true neurasthenia, characterized by great fatiguability and due to metabolic intoxication; (f) cenesthopathia, which term designates a state we believe due to perverted sensations from the autonomic nerves in the viscera or their hypothetical centers; (g) mental debility, congenital or acquired; (h) the dreamlike states, seen in the early periods of dementia precox and confusional psychoses, and very often miscalled hysteria on account of the bizarrerie of the patients' acts and words, and (i) lastly, the emotional perversions of degenerates.

So that we conclude, 1. That all the symptoms which may legitimately be included under hysteria are imposed by suggestion. 2. That the state of suggestibility is derived from (a) faulty education, tending to perpetuate and fortify the natural suggestibility of the child; (b) cerebral modifications due to organic causes, the action of which necessarily varies among individuals in accordance with (c) the hereditary constitution.

The doctor then has created a hysteria taking the form of nervous dyspepsia.

The patient then should be curable by suggestion-persuasion, and this is indeed the case as the following example will show.

HYSTERICAL FOOD PHOBIAS—THEIR REMOVAL BY PSYCHOTHERAPY.

—A child aged eleven years was referred because of dyspepsia and a capricious appetite. During the preceding three years, she had left school three different times because of her health. The only occasion on which any definite disease had occurred was six weeks before she was sent to me, in form of a slight operation upon an infected corn. After this she had been dieted and seemed to improve for about two weeks; but during the week preceding my consultation, she had lost one and a half pounds.

Anamnesis.—Upon going to bed she feels sick and weak, and pains shoot all through her; she has had a constant headache for several months. When she feels ill, she is very peevish; she felt homesick for playmates as she had made no friends in Washington, where she had only been a few months. Instead of playing she sat or lay about most of the day, feeling too tired to fetch her books for reading, of which she was formerly very fond; she had also been fond of games formerly. She had had glasses since the age of eight, but had not worn them until lately. Her appetite was very poor.

Examination.—Showed rather feeble reflexes, the feet were flat, but not pathologically so. Motility less vigorous than normal, especially in the ankles; unskillful diadokokinesis; a tic of the shoulder, much wriggling; normal sensibility. Psychologically, there were no intellectual abnormalities nor marked emotional reactions except that the little girl wept when it was proposed to take her away from her mother and father to the hospital. The mother had been very conscientious in her upbringing, and this had reacted on the child, before whom far too much attention had been shown regarding both manners and physical welfare. Conversation before her would frequently concern the appropriateness of different foods and their digestibility, and the atmosphere of the home was one of solicitude about the child's health.

As an infant, she was not retarded; she had been apt at school except in writing, when her hands would jerk, but they did not do so in sewing, in which she was skillful. Her bad writing in school disturbed her, and she would become "hysterical." Respiratory infections were easy and frequent, as was the case with her father. Perhaps this was referable to mouth breathing, for which adenectomy was done when she was eight.

Diagnosis.—The stomach functions were performed quite well, and no physical disorder of the digestive apparatus could be detected. As the conditions for the implantation of an *idée fixe* were apparent, and as conversation with the child herself corroborated my suspicion of this, it was evident that we were dealing with a case of hysterical nosophobia.

By this is meant a fear of disease implanted by suggestion, a matter very easy in young children and uncritical people in general. But it is quite exceptional for food and appetite to be the subject of a phobia in so young a child, for in the child the vegetative functions and instincts are paramount. While in Paris in 1906-1907, I saw one other case of this type of false gastropathy in a young child (published by Déjerine since).

Treatment.—She was sent to the hospital on account of the nosophobia from which she suffered, the result of too much sympathy at home. When her parents left her, she wept bitterly, but she was soon cured by a little badinage and diverting her attention to new scenes. She promised to behave properly if her parents were allowed to visit her; this promise stopped the weeping for twenty-four hours, but the visit was postponed and she was encouraged to play with another little girl patient. This she came to enjoy so much that she ceased to ask for permission to go home. When she had become quite contented and happy she was allowed to return home, where she has remained well ever since.

The treatment in hospital consisted of creating an atmosphere round the little patient designed to show her how trivial were her own preoccupations about what she should eat as compared with the real suffering and disabilities of the patients in the ward. Of design she was placed in the open ward in preference to a private room. She was shown to what a degree her feelings and behavior were under her own control, and no solicitude was shown about whether her food would agree with her or not.

It is not possible to set down in detail the numerous measures used to destroy the inconvenient suggestions to which she had been subject so long. While the therapeutics inevitably contained a modicum of suggestion, yet the end worked for was always the giving of a rational understanding to the little patient of why her symptoms had occurred and how to prevent them in future. In other words, the *modus operandi* was persuasion and reëducation. Towards this the hospital furnished a valuable aid, but not merely because it was a hospital, but because the nurses were intelligent coadjutors in the treatment. The child had been too much derationalized to have been manageable by office consultations alone, unless the mother had been able to collaborate, which she was unable to do, not from lack of intelligence or conscientious desire for the good of her child, but because she did not understand the psychological mechanism of her daughter's illness. The mother's reëducation was much more readily effected when uncomplicated by the child's presence. Its success was shown by her successful management of the child when she returned home, for eighteen months later there had been no further trouble.

FADS ABOUT FOOD.—Especially in children the occasions for unwise prejudices against or in favor of certain foods are very numerous. They are due to the way of looking at these observed by the child on the part of his elders. Pessimistic feeling is easily engendered by focussing the attention upon the unpleasant feature of any situation. In this way, susceptible individuals are easily incited to more disgust of any object or condition. If the object is food or the appurtenances of feeding, loss of appetite, nausea and arrested digestion will result through the mechanism previously explained.

To deal with such a condition, there are two ways. One is to educate the child in the direction of not permitting himself to be so suggestible as to allow extraneous considerations to influence his judgment.

Another way of obviating the bad consequences of pessimistic surroundings is the looking upon the bright side of every situation, either beforehand or as it arises. It is this principle which has been adopted by certain sects who profess to heal disease. The same principle has been utilized by moral philosophers in all ages. Unfortunately, logicalness and respect for the truth are usually absent from the modern exponents of this method, whose wish is too often the sole support of their thought.

It is not by the inculcation of an ill-founded optimism that the psychotherapist of this day seeks to marshal and strengthen the psychological forces of his patient. He endeavors to do so by giving his patient the understanding of his own potentialities and deficiencies, in order that he may learn to manage them skillfully and live wisely according to his capacity. This does not mean that modification of disadvantageous traits is not sought, but only that is attempted which a wise psycho-diagnostic survey shows to be expedient and possible. The wild goose chase of creating out of a Moron a self-sustaining city dweller is seen in the proper perspective as merely a less aggressive absurdity than the attempt to make a Newton from an idiot.

This kind of psychotherapy recognizes that just as physical exercise is needed for strong muscles, mental and moral exercise is needed for a strong mind. The child must be taught to weigh and choose even at the expense of mistakes, rather than that mistakes should be avoided by confining choice to his guardians.

Sitomania or Morbid Desire for Food.—Complementary to the obsession that food or some particular kind is obnoxious is the obsession to take food to give strength for some ordeal. This false notion is based upon the truism that energy is derived from food. It is a manifestation of the psychasthenic state, being one of the responses to the feeling of inade-

quacy which is the hallmark of that disease. The desire to escape this feeling leads to some very peculiar reactions. For instance—one of Janet's patients would pour boiling water on her foot to get rid of her more distressing mental suffering. Alcohol is frequently a resort of such persons. Burns knew it when he sang—

Kings may be blessed, but Tam was glorious,
O'er all the ills of life victorious.

Whatever the act resorted to by the psychasthenic, he comes to crave it, for it relieves his suffering or tenseness or discomfort.

It may take the form of untimely or intemperate eating. Thus a woman who had a severe agoraphobia would carry in her reticule an assortment of comestibles whenever she went out in the street. To gain strength to cross the Rue de Bac, she would take a bite from a croissant, a piece of cheese enabled her to cross the Pont Neuf, but when she came to the Place de la Concord its vast and terrifying distance compelled her to consume at least a fowl's wing before it could be compassed. The absurdity of this is no greater than that of the ticqueur who, by a simple touch of the finger to the chin, inhibits the powerful turning of the whole head in the torticollis movement which is his obsession. It is no more absurd than the imperative need of placing one's clothes in a minutely meticulous position on one's chair, and insisting that they be turned in a certain way while dressing, so that the performance may require upward of two hours, as in the case of a young man which I have reported.

REFERENCES

1. DONALDSON, H. H. The Growth of the Brain.
2. MENDEL and OSBORNE. J. Biol. Chem., 1913-14-15.
3. VAUGHAN. J. Am. Med. Assn., 1915.
4. WHIPPLE. *Ibid.*, July 1, 1916, p. 15.
5. VAUGHAN, VICTOR. *Ibid.*, Nov. 25, 1916; Protein Split Product, pub. by Lea & Febiger, Philadelphia, 1913.
6. PRYER.
7. LEVIN.
8. EMERSON and CHAMBERS. J. Biol. Chem., 1916.
9. FISCHER. Edema and Nephritis, pub. by Willey & Sons, Inc., London and New York, 1915; Proc. Soc. Exp. Biol. & Med., 1915.
10. WILLIAMS, TOM A. Am. Med., 1904.
11. ————. J. Biol. Chem., Dec., 1916.

12. MCGREGOR, E. H. *Ibid.*, 1913.
13. MYERS, MOSENTHAL ET AL. A series of papers in J. Biol. Chem., 1911.
14. SOUTHARD and CANYVAN. Mass. State Hosp. Rep., 1915.
15. HARE, F. The Food Factor in Disease.
16. MERCIER. Clin. J. Ment. Sci., July, 1916.
17. WILSON, STERNE and JANNEY. J. Biol. Chem., 1915, p. 70.
18. BABINSKI. Discussion sur Physterie, Rev. Neurol., 1907.
19. WILLIAMS, TOM A. The Management of Confusional States, Internat. Clin., 1916.

CHAPTER XXII

DIET AFTER SURGICAL OPERATIONS

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AND

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General Considerations: Methods of Feeding; Influence of Various Factors on Postoperative Feeding; the Postoperative Dietary Value of Water. Postoperative Feeding: The Normal Case; Special Dietary Problems Arising from Anatomical and Physiologic Causes after Operation; Special Dietary Problems Arising after Operation from the Presence of Organic Diseases.

GENERAL CONSIDERATIONS

Methods of Feeding—NORMAL FEEDING BY MOUTH.—If the successful feeding of the normal individual out of the hospital is an art, how much more of an art is the feeding of the sick! Just as certainly as appropriate table appointments at home promote appetite and good digestion, as certainly, even more certainly, does a neat and daintily arranged tray attract the fickle appetite of the sick. The most important factor of hospital diet is the tray itself. The pleasant surprise, the encouraging word, the small quantity, the variety—all are allies to induce appetite and promote digestion. The psychic stomach is no less important than the anatomic stomach. With what admirable perfection do some nurses devise and execute the dietary needs of their patients, in how commonplace a manner do others attempt, unsuccessfully, to accomplish the same end!

FEEDING BY TUBE.—However enthusiastic even a refractory patient may become over a daintily arranged tray and perfectly balanced menu, no patient can be expected to look forward with pleasant anticipation to periods of rectal, nasal, pharyngeal or other varieties of feeding by

tube. Nevertheless, even when one or another of these methods is required, the unpleasant features of the experience may be minimized by skill and gentleness in the manipulations; by tact and diplomacy on the part of the operator.

NASAL FEEDING.—Diet may be given through the nose—milk, eggs, strained cereals, fruit juice, cocoa, tea, barley water, cream soups, egg-nog, etc. Three important points in technic should be noted: first, the catheter must be smooth and well anointed; second, it must be skillfully introduced; and third, the nasal passage should be anesthetized by a novocain spray.

PHARYNGEAL AND ESOPHAGEAL FEEDING.—Feeding through the pharynx and the esophagus¹ demands the same technic as for nasal feeding, but a larger tube may be used.

RECTAL FEEDING.—One of the simplest and perhaps one of the most effective methods of feeding by rectum² is the administration of a four per cent solution of glucose and sodium bicarbonate by means of the slow Murphy drip. The glucose is readily absorbed and supplies a large number of calories. It is not at all certain that the more elaborate methods involving special formulæ, which are mentioned in other chapters, will accomplish more in a given series of cases. These methods frequently cause irritation and in consequence even water is not absorbed. Glucose and sodium bicarbonate rarely cause irritation, even when they have been used for days.

DUODENAL FEEDING.—The development of the technic of duodenal intubation³ has opened the way for feeding in certain cases of persistent vomiting. In Lakeside Hospital, Dr. Blankenhorn has successfully fed several of our surgical cases by this method.

INTRAVENOUS FEEDING.—The work of Woodgat seems to be opening the way for a more efficient method of intravenous feeding.⁴ He has devised an apparatus which introduces fluids into the circulation at a governable rate, so that thus he has been able to give glucose at will.

TRANSFUSION OF BLOOD may not be regarded as feeding, but certainly blood has not only a definite work value but also a definite food value. In acute cases, therefore, blood transfusion gives a certain amount of the most immediately available food. The technic of blood transfusion has now been so thoroughly perfected that it is readily available.

¹ See Special Methods of Feeding, Volume III, Chapter XXVIII, page 750.

² *Ibid.*, page 715.

³ *Ibid.*, page 741.

⁴ *Ibid.*, page 749.

Influence of Various Factors on Postoperative Feeding—THE ANESTHETIC.—Other considerations aside, it is obvious that a patient whose operation has been performed under local anesthesia will at once take a more generous diet than a patient upon whom the same operation has been performed under inhalation anesthesia; and that a patient who has had nitrous oxid anesthesia will take a general diet earlier than one who has undergone ether anesthesia. Moreover, while the nausea, vomiting and depression which follow ether anesthesia are affected directly by the length of anesthesia, prolonged nitrous oxid anesthesia does not cause marked nausea or depression, so that after nitrous oxid anesthesia a general diet may be resumed whenever hunger returns, unless the nature of the operation itself has been such as to demand special dietary consideration. Very frequently a patient who has undergone nitrous oxid anesthesia demands and receives his next meal immediately after the performance of the operation.

Postoperative feeding is modified not only by the type of anesthesia, but also by the degree of skill with which it has been administered. If the anesthetic is administered unevenly, so that the anesthesia is now too light, and again too deep, especially if it be so deep that death threatens, then the postoperative period before feeding can begin is far longer than after a skillfully administered even anesthesia. It follows, therefore, that the combination of local anesthesia with the lightest possible and most skillfully administered general anesthesia, whether nitrous oxid or ether, will induce the minimum degree of postoperative digestive disturbance.

AGE.—In infancy, the problem of feeding is often paramount to the operation itself. In such cases, it is of the highest advantage to put the entire problem of feeding into the hands of a skilled pediatrician. If the operation is one of choice rather than of urgency, then the nutritional balance should be definitely secured prior to the operation. The general rules for infant feeding, as given in another chapter in this volume, should be followed.¹ In old age the appetite is always fickle and the digestive powers feeble. Senile patients, therefore, require special dietary consideration before as well as after operation.

NATIONALITY.—Nationality plays an important rôle in dietary considerations. The normal Chinaman is highly dissatisfied with the dietary of the western peoples. The German, the Italian, the Jew, the Frenchman, the Englishman, all have distinct preferences that should

¹ See Section on Infant Feeding, Volume II, Chapter XV.

be considered, especially in the aged whose dietary habits are rigidly fixed. In quality, quantity and kind, therefore, postoperative diet, like the diet of normal life, must be adjusted to the individual patient. The more nearly the individual's habits and traditions are followed, the more successful the dietary.

The Postoperative Dietary Value of Water.—The universal craving for water by the postanesthetic, postoperative patient; by the patient with infection; the patient with exophthalmic goiter; the patient in shock; in hemorrhage; in starvation; in acidosis—is a highly significant fact, a fact to be compared with the respiratory drive in the same groups of cases. It is an insistent demand for the dilution of acids which are either retained, or are being formed at an excessive rate. Even at this stage of medical knowledge, the supreme value of water is not fully appreciated and its administration is often neglected and mismanaged.¹ The surgical case craves water more than anything else. Thirst is an outstanding distress. Thirsty patients will drink water at any time; they will steal water; will drink from the water bottles; will eat the ice in ice caps; will even creep out of bed at night and slake their intense thirst at the tap.

Water taken by the mouth may accumulate in the stomach to be rejected; water given by the rectum may accumulate there to be expelled. In the average case, the administration of water by the rectal drip with sips by mouth are sufficient, while in critical cases the one certain and safe method is by subcutaneous injection. For example, in severe cases of shock; in acute peritonitis; after resection of the intestines or of the stomach; in hemorrhage; in severe cases of common duct stone; in diabetes—the average individual may safely be given 2,000 c.c. of salt solution subcutaneously in twenty-four hours. Excessive amounts of water are not likely to be absorbed by the subcutaneous route. As long as water is absorbed at the normal rate, the quantity is probably not too large.

There are two principal objections to giving water intravenously: first, it can thus be given safely only by an expert; and second, there is no criterion as to whether or not any given amount is excessive.

POSTOPERATIVE FEEDING

The Normal Case.—In normal operations on normal individuals in neither infancy nor old age, such for example as hernia operations; resec-

¹ See Volume I, Chapters X and XVI, and Volume II, Chapter X, page 308.

tion of joints; removal of goiters or of tubercular glands of the neck; plastic operations; small abdominal operations, such as for appendicitis; the removal of benign tumors of the pelvic organs, etc.—it is safe to put the patient on water as soon as he desires it, giving small sips at a time; this may be soon followed by liquid food, then by semi-liquid, and finally by solid food of the kind and quantity that best meet the patient's previous habits and his desires. In such cases the problem of diet is insignificant.

Special Dietary Problems Arising from Anatomical and Physiologic Causes—

AFTER INTUBATION.—After intubation, water and liquids only are used until swallowing incites no cough. At first sips of warm water are given, as relatively small harm will result if any is inhaled. Sometimes the supine posture aids, as thus the water is carried back behind the laryngeal opening and may the more certainly escape inhalation. As soon as fluids are safely managed, semi-solids, and finally solids may be taken.

LARYNGECTOMY.—After laryngectomy the problem of feeding is paramount. If possible, it is best to force food before the operation, but it must be borne in mind that in these cases the inhalation of blood or mucus or food is the common cause of broncho-pneumonia and death. If the pharynx is closed at the time of operation, then food should be given by tube through the pharynx or nose. The patient should not be allowed to swallow, as even if the pharynx is closely sutured, the strain of swallowing may cause it to open at some one point and food will be inhaled; inhalation of fluid means pneumonia—pneumonia means death. Nevertheless, it is of vital importance to maintain the nutritional balance of these patients, and to this end, eggs, milk, broth, gruel, finely divided meats, fruit juices, etc., should be included in the dietary.

OPERATIONS IN THE MOUTH.—Cleft palate operations are frequently performed on infants. In these cases, especially if the intermaxillary bone and hard palate are absent, the nutritional balance is lost. It is essential, therefore, that to the utmost degree possible the nutritional balance be restored before the operation. After any operation in the mouth, such as for cleft palate or excision of the tongue for cancer, the palate and pharynx are tender and sore, so that in swallowing, pharyngeal co-ordination is defective, and consequently food is sometimes inhaled. In operations in the mouth, therefore, the utmost care must be exerted to attain two ends: (a) the prevention of the inhalation of food; and (b) the restoration and maintenance of the nutritional balance.

OPERATIONS FOR CANCER OR ULCER OF THE STOMACH AND DUODENUM.—In many cases of stomach or duodenal ulcer or cancer, partial ob-

struction exists; in many there is pain; in some, hemorrhage. Hence, in each of these cases, we have to deal with an impaired patient; and it follows that the management of the diet immediately before and immediately after operation may directly affect the possibility of the patient's recovery from the operation itself.

Moreover, another equally important dietary problem arises from the fact that in part, at least, the *final* cure of ulcer of the stomach or duodenum is dependent upon the maintenance of diminished acidity.

To promote this end, water, glucose and alkalies should be given in large quantities, both before and after operation. Until food is taken, normal saline solution should be injected subcutaneously, and a four per cent solution each of sodium bicarbonate and glucose given by the Murphy drip.

The following diet, subject to many modifications, is given to our gastric and duodenal ulcer cases at Lakeside Hospital:

POSTOPERATIVE DIETARY FOR GASTRIC AND DUODENAL CASES

First Day:

Water in small amounts by mouth and by hypodermoclysis as ordered by the House Staff.

Second Day:

Water by mouth as ordered.

Third Day:

(If routine treatment is ordered) $\frac{1}{2}$ ounce each of milk and cream q. 1 h. from 6 A.M. to 8 P.M.

Each morning before feedings are begun, give 1 dram bismuth sub-carbonate in 1 or 2 oz. of warm water.

Midway between each two feedings, give Calcine Magnesia, Sod. Bicarb. and Bis.

Sub-carb., aa gr. V, in $\frac{1}{2}$ ounce of warm water. If there is no discomfort at the end of the third day and the patient is progressing well, then on the

Fourth Day:

Milk and cream aa 1 ounce q. 1 h. Continue powders, as above.

Fifth Day:

Milk and cream aa 1 ounce q. 1 h. Continue powders.

Sixth Day:

A soft-boiled egg may be added to the milk in A.M. and P.M.

Seventh Day:

Soft-boiled eggs as on sixth day; two if desired. Add 3 ounces of well-cooked cereal at noon. Then gradually add eggs and cereal to other feedings, until the feedings approximate but do not exceed 6 ounces each. The maximum daily diet should not exceed 4 eggs and 4 feedings of cereal in addition to milk and cream. The cereals used may include well-cooked rice, oatmeal, farina and cream of wheat.

At the end of ten days, small quantities of stewed fruits, jellies, seedless marmalades, cream soups of all kinds, toasted crackers and milk toast, or purée of potatoes may be added to the diet.

In the second week, increase the length of time between the feedings so that at the beginning of the third week food is taken every three hours. The total bulk in any feeding should not be more than eight ounces.

For several months the patient should eat at least five times a day. For one year or more the following dietary should be used: milk, cream, cereals, soft eggs, vegetable purées, cream soups, bread and butter, and meats when desired.

RESECTION OF THE INTESTINES, ACUTE PERITONITIS.—In resection of the intestines and in acute intestinal infection, it must be borne in mind that the digestive processes are practically suspended so that the digestive tract can be depended upon but slightly for assistance in maintaining the nutritional balance of the patient. In these cases, therefore, we inject subcutaneously approximately 2,000 c.c. of saline solution, and give a 5 per cent solution each of sodium bicarbonate and glucose solution per rectum by the Murphy drip,¹ and give nothing by mouth until anatomical and physiologic readjustment permits.

Problems Arising After Operation from Organic Diseases—DIABETES.—We are occasionally forced to perform serious operations upon diabetic patients, such as amputations for diabetic gangrene, excision of carbuncles, appendectomy, etc. Whenever the case warrants delay, we use the Allen treatment until the urine is sugar free and acid free. Then the operation is performed and is followed by the diabetic diet. I am certain that in these cases the dietary problem is paramount.

POSTOPERATIVE DIETARY FOR DIABETIC PATIENTS

Soups: All stock soups and bouillons.

Meats: Meats, poultry, and fish of all kinds prepared with flour, except internal organs, such as liver, kidneys, sweetbreads, etc.

Vegetables: Asparagus, artichokes, cauliflower, cabbage, Brussels sprouts, sauerkraut, onion, young green beans, tomatoes, celery, lettuce, chicory, watercress, endive, spinach, pickles, olives, mushrooms, egg plant, Swiss chard, either leaves or stalks. Gooseberries, rhubarb, grapefruit, nuts of all kinds except chestnuts.

Eggs: In any form.

Breads: Bran bread.

Desserts: Gelatin sweetened with saccharin and flavored with coffee, cream, nuts, sherry, brandy. Custards of cream sweetened with saccharin. Clotted cream. Ice cream.

Cheese: All kinds used abundantly.

Beverages: Tea, coffee, lemonade, sweetened with saccharin.

Fats: Should be used plentifully in cooking, salad dressing, cream.

¹ For description see Special Methods of Feeding, Volume III, Chapter XXVII, page 732.

TUBERCULOSIS.—In the treatment of any tubercular condition, whether generalized tuberculosis or tuberculosis of the peritoneum, of the bones and joints, or of the lungs, the dietetic and hygienic factors are of paramount importance. Therefore, to the extent that the tuberculosis routine¹ can be carried out will surgical healing be facilitated. It logically follows also that the success of the operation and the extent of the cure is in part, at least, determined by the postoperative feeding. For example, in cases of tubercular glands of the neck with mixed infection, and of tuberculous bones and joints, the success of surgical treatment is proportional to the efficiency of the postoperative dietary and hygienic regimen.

PLYLEPHLEBITIS.—Formerly most of the cases of pylephlebitis died, after several weeks or months, marked by a gradual loss in weight and strength. It occurred to us that since these extensive infections of the veins of the liver are beyond any effective treatment, it would be well to put these cases on the dietetic and hygienic regimen of acute tuberculosis. These patients, therefore, live on the veranda and their feeding is forced. Since adopting this method of treatment, we have had fourteen consecutive recoveries.

CARDIOVASCULAR CASES.—Many of our surgical cases have cardiovascular disease, and therefore it is essential that both the preoperative and the postoperative diet should conform to the special diet prescribed for cardiac cases.

In planning the dietary for cardiac cases, the aim should be to supply an adequate diet, easily assimilable. It is also essential that it be comprised of food materials which will not readily ferment, since fermentation and distention tend to embarrass further the heart action and the circulation. At Lakeside Hospital, the general diet orders for cardiac cases are as follows:

DIETARY FOR CARDIOVASCULAR CASES AFTER OPERATIONS

<i>Water:</i>	In limited amounts, as specified by the House Surgeon.
<i>Vegetables:</i>	All green vegetables; starch vegetables restricted; no fermenting vegetables, such as those of the cabbage family or legumes.
<i>Milk:</i>	8 ounces t.i.d. to be sipped slowly with meals.
<i>Bread:</i>	In small amounts.
<i>Meats:</i>	Roast beef, steak, lamb, chicken, fish. No internal organs, such as liver, sweetbreads, heart, etc. No raw, smoked, cured or rare meats.
<i>Eggs:</i>	In limited number.
<i>Fats:</i>	Butter, cream, olive oil, mayonnaise.
<i>Desserts:</i>	Custards, jellies, ices, sherbets, stewed fruits, oranges, grapefruit.

¹ See Volume III, Chapter V, p. 198; see also Volume III, Chapter XXVIII.

EXOPHTHALMIC GOITER—GRAVES' DISEASE.—After thyroidectomy, the patient should have a quart of saline solution given very slowly per rectum (C. H. Mayo), which should be repeated twice during the first twelve hours. If intestinal relaxation is present, then it should be given subcutaneously in all cases. A competent trained nurse is a necessity in the pre- and postoperative care of all cases of Graves' disease. There is no analogous disease nor toxemia comparable to the condition which follows operation upon people afflicted with hyperthyroidism. In this disease, the metabolism is constantly accelerated. The appetite is usually good, but loss in weight continues. Therefore it is important, if possible, to regain at least part of the lost weight. To this end, the patient is given more than the normal number of calories in a standard diet, from which meats, especially red meats, are generally excluded. In these cases, fluids are especially urged.

DEPRESSED RENAL FUNCTION.—In many surgical cases, the functional capacity of the kidneys is diminished. This is notably true of cases of enlarged prostate, kidney stones, kidney abscesses and tuberculosis; in cases of protracted infection of bones, in chronic abscesses, in advanced pregnancy etc. The Lakeside Hospital dietary for these cases, subject to modification, is as follows:

**DIETARY AFTER OPERATIONS ON THE GENITO-URINARY ORGANS
OR IN CASES OF DEPRESSED RENAL FUNCTION**

Milk in any form in limited quantity.

Buttermilk.

Kumiss.

Whey.

Junket.

Peptonized milk.

Cream.

Cocoa.

Cream soups of all kinds except those made with beans and peas.

Stewed fruits of all kinds, except lemons and grapefruit.

Vegetables—Potatoes, squash, carrots, beets, cabbage, cauliflower, Brussels sprouts, lettuce, celery, artichokes, tomatoes, spinach, sauerkraut, onions.

CHAPTER XXIII

DIET IN CHRONIC INTESTINAL STASIS BEFORE AND AFTER OPERATION

A. EVERETT AUSTIN, A.M., M.D.

Chronic Intestinal Stasis: Acute Exacerbation; Chronic Intestinal Stasis Without Operation; Chronic Intestinal Stasis After Operation.

CHRONIC INTESTINAL STASIS

Acute Exacerbation—DIET IN ACUTE EXACERBATION.—The diet under such conditions must be varied largely, depending upon the existence of acute exacerbation or a less violent state, and, to a certain extent, according to the site where the obstruction occurs.

During the condition of acute exacerbation, where the appetite fails or there is persistent vomiting, it is desirable that for a day or two, no food at all be taken. The thirst induced by the vomiting may be quenched by lumps of ice, which should be sucked by the patient with possibly a few drops of brandy added, in order to sustain the failing strength as far as possible. After the vomiting and pain are somewhat allayed, provided the obstruction is spontaneously released, and operation is not considered desirable, we may begin by giving small amounts of milk, not over a wine-glass at a time, taken at intervals of an hour. The milk may be previously digested by the various preparations used for this purpose, the most satisfactory of which, in my estimation, is the lactone tablet, which gives a smooth, even solution, with the curds well broken up, so that they can often be passed through a piece of thin gauze. In addition to this, meat juice can be employed, expressed from a good piece of broiled steak, to which a little salt has been added, and which, in my opinion, is superior to the preparations of a similar kind on the market, all of which contain more or less alcohol or some antiseptic to preserve them.

In order to reinforce the nutritive value of the milk or beef juice,

toast, finely ground in a coffee grinder, can be added in the proportion of a teaspoonful to a wineglass.

In order to increase the variety, gruels of sifted oatmeal or cornmeal may be given, prepared with half milk after being thoroughly cooked previous to its addition.

Fruit juices, either orange, grape or grapefruit, are also allowed. In order to increase their efficiency and add to their palatability, milk sugar may be added, in the proportion of a tablespoonful to a glass.

If the progress toward recovery is uninterrupted, we may then employ gelatin, which can be served with cream and milk sugar, the latter being preferable to cane sugar on account of its lessened tendency to fermentation, which always has a very unfavorable import in overcoming obstructions of any kind in the intestinal tract.

When the obstruction and temporary colicky pains are overcome by these means, we may begin giving mashed vegetables, like potato or squash, in which a large amount of butter has been incorporated, or, in its place, heavy cream may be added, in order to increase its nutritional value.

For a long period after recovery, great care must be taken to avoid all vegetables containing much cellulose, like cabbage, lettuce, turnips, radishes, celery, cauliflower, etc. Our patient, however, may begin the use of meat, which at first should be finely chopped and served baked or broiled, never fried, with the addition of butter as well as pepper and salt. If potato produces distention, as it rarely does when baked or mashed, we may employ well-cooked rice as a substitute, which may be made more palatable by the addition of butter or a little soft cheese cooked with it; macaroni may also be employed as a substitute for potato.

Bread should always be eaten stale, but can be made more palatable by reheating it or toasting, softened with milk or hot water and then seasoned with butter. This is the so-called milk or cream toast.

The patient's thirst should be overcome by the use of fruit juices diluted with water, or with water itself, avoiding large quantities at a time. Sirups should never be added to the water, and above all, no carbonated drink should be tolerated.

One should always have, as far as possible, a definite idea of how much of each article of food is taken during the day, measured in terms of tablespoon, glass, slice, etc., from which can be determined, roughly, the caloric value of the day's food, so that by comparison with the usual eighteen hundred to two thousand calories, we may learn whether our patient is being undernourished or not.

The patient should never be allowed to become constipated, and while laxatives must at first be avoided for fear of exaggerating the condition which we are trying to overcome, reliance must be placed on rectal injections, to be followed later by the use of sweet oil, of which a wineglassful may be taken night and morning.

All efforts to encourage intestinal peristalsis by means of cellulose-containing foods, like black bread, graham bread and whole wheat bread, must be avoided for a long period after the acute obstruction. All green vegetables mentioned above, pickles, nuts and salads must be eschewed for a period of months after the acute attack.

These suggestions are incorporated in the following diet list:

DIET LIST FOR INTESTINAL STASIS DURING EXACERBATION

		Calories
7 A.M.		
A cup of cocoa made with milk and water.....	350	
Soft buttered toast (one ball of butter).....	220	
	—	570
10 A.M.		
A large saucer of gelatine (fruit flavor).....	400	
Two tablespoonsful of cream (medium).....	60	
A tablespoonful of milk sugar.....	140	
	—	600
1 P.M.		
A soup plate of broth.....	160	
Two Uneeda crackers ground fine.....	60	
	—	220
4 P.M.		
A cup custard (cold).....	500	
	—	500
7 P.M.		
Four tablespoonsful of ice cream.....	540	
	—	540
10 P.M.		
A bowl of gruel (cereal).....	75	
Two tablespoonsful of cream (medium).....	60	
Two ground Uneeda crackers.....	60	
	—	195
12 M.		
Eggnog, one egg.....	75	
Glass of milk.....	160	
Wineglassful of brandy (two tablespoonsful).....	85	
	—	320
TOTAL.....		2,945

RECTAL FEEDING.—When in cases of intestinal obstruction, oral feeding becomes impracticable on account of the nausea, vomiting and often pain produced through the stimulated peristalsis, we may have recourse, temporarily, to rectal feeding.¹

When this method is chosen, we must observe the same care in the selection of the different ingredients of a normal diet, fat, protein and carbohydrate as in selecting a diet to be taken by the mouth.

PROTEIN.—As regards protein, the most desirable in this method of providing nutriment are the partially digested forms, namely, peptone and albumose, sometimes termed the proteoses. The more thoroughly digested the protein, the more rapidly will it be absorbed by the rectum, thereby preventing the putrefaction which so frequently takes place.

Egg is much less adapted to this purpose for the very reason that putrefaction occurs early and extensively. As the most available form of digested protein, we have Witte's peptone, so commonly used in laboratories, which can usually be obtained in the majority of drug stores. As a substitute, laibose and somatose may be employed, which serve the purpose equally as well, and are, perhaps, more easily procured. Caution must be employed, however, even in the use of these preparations, because the employment of more than sixty grams (three tablespoonsful) in one enema is liable to cause irritation of the rectal mucous membrane with ejections of the enema and a subsequent excessive irritability.

The use of the casein preparations, nutrose, etc., for this purpose is not to be recommended, since their absorption is extremely slight. If digested protein cannot be procured, raw eggs may be employed; the absorption, however, is very much increased by the addition of cooking salt, one gram to each egg. Nevertheless, the absorption of egg is much slower than that of peptone, thereby producing the before-mentioned putrefaction and inflammatory processes in the rectum, which render the continuance of the rectal nutrition ineffectual. The instant that a putrefactive odor is noticed in the dejections, the employment of eggs must be abandoned and replaced by carbohydrate, in the form of glucose.

A subsequent cleansing enema with disinfectant fluids, like solutions of boric or salicylic acid, will generally forestall this danger.²

CARBOHYDRATES.—As carbohydrate, we employ chiefly starch and sugar, and better, glucose, as constituents of the nutrient enemata. The starch is absorbed only when it has been previously partially converted into amidulin, which can be done by roasting or boiling potato or corn-

¹ See Volume III, Chapter XXVI, page 715.

² *Ibid.*, page 726.

starch. This class of partially converted starches is represented by Mellin's food, which can be employed in the same proportions as the partially digested starch. Starch itself, in emulsion, will eventually be converted into these products by the amylase of the pancreatic secretion as well as by the ferments contained in the intestinal bacteria. On account of the tardiness of this conversion, however, the starch is very slowly absorbed. As a substitute for the converted starch we may use glucose in ten per cent solutions either alone or in addition to other nutrient agents. The ten per cent concentration, however, should never be exceeded, because here again we incur the danger of exciting irritation and diarrhea.

FATS.—Fat is wholly unsuitable for rectal feeding, since it is only absorbed in minimal amounts. The reason for this is not evident, as it has been found that the greater part of the injected fat which has been used for this purpose is well split, and why emulsification does not take place is not clear. The fat absorption can be improved by mixing the fat with a certain amount of chopped pancreas, this mixture to be suspended in milk and injected into the rectum. The preparations of pancreatin are useless for this purpose, because while they contain trypsin and amylase, they rarely contain the slightest vestige of steapsin. By means of the fresh pancreas, however, fat becomes split and saponified, by which its absorption is vastly increased. In this way it is possible for the organism to absorb often twenty to fifty grams of fat, which is highly advantageous on account of its high caloric value. Many cases occur, however, in which the injection of fat produces irritation of the rectal mucous membrane and rapid ejections before the fat can be absorbed, while the irritation of the fatty acids often produces in addition a catarrh of the lower intestinal tract. The most available and valuable menstruum for suspension of these various fat products is milk, of which not more than 250 c.c. (one cupful) can be employed at one time on account of the resulting overdistention of the rectum.

FORMULÆ FOR RECTAL ENEMATA.—Various formulæ for rectal enemata have been given, of which the following are, perhaps, the most popular:¹

(a) Peptone, 60 grams; milk, 250 grams. The caloric value of this injection exceeds 300, according to the value of the milk.

(b) Cooking salt, 3 grams; well-beaten eggs, 3; ground toasted bread or Mellin's food, 40 grams (two tablespoonsful; milk, 250 grams (one cupful). The caloric value of this enema is 500, an amount which can rarely be exceeded in a single injection.

¹ See also Volume III, Chapter XXVI, page 730.

(c) Laibose, one teaspoonful; well-beaten eggs, two; claret wine, two table-spoonsful, 20 per cent glucose solution, 100 c.c., or three ounces. This gives a caloric value of about 300.

As can be readily seen, when three injections a day are given, a frequency which cannot be exceeded on account of the danger of producing diarrhea, the caloric value which our patient obtains rarely exceeds 1,200 calories, which may possibly be increased to 1,500. Furthermore, when we consider that the enemata are never fully absorbed but that a large amount is ejected—under continued rectal feeding the amount ejected steadily increases—we can readily see that the patient must necessarily be in a constant state of undernutrition; hence, the process cannot be extended beyond the shortest possible period of time needed to overcome the emergency which has exacted it.

Very often the thirst from which the patient suffers is more trying and more injurious to his general condition than the temporary fasting, and the drop method of giving fluid has been suggested and successfully employed for this purpose. This can be readily carried out by a small reservoir with a pinch cock attached to a rubber tube, which can be so regulated that the drops succeed each other at any frequency desired. Attached to this is a long rectal tube which may be inserted as far as the sigmoid, and unless the peristalsis of the lower bowel is very much increased, will remain permanently in place without any discomfort to the patient. It is often advisable to insert between two lengths of the rubber tube a piece of glass tubing, or better still, a dropping bulb, which enables one to see without difficulty the rapidity with which the drops leave the reservoir. As solutions for this purpose, a salt solution may serve, consisting of a pinch of salt and a cup of water, or, more accurately, the so-called physiological salt solution which contains six grams to the liter. Another excellent solution which also has no insignificant food value is the ten per cent solution of glucose in water, of which a liter may be introduced daily.

As a stimulant, we may use 150 c.c. of beef tea to which 100 c.c. of claret wine have been added. This solution will be rapidly and completely absorbed, as one can readily learn from the cessation of thirst and the increase in the urinary secretion.

TECHNICALITIES OF RECTAL FEEDING.—As regards technicalities of rectal feeding, we must employ the soft rubber rectal tube which should always be well smeared with vaselin or with the so-called surgical lubricants provided by the supply houses; the latter preferably, on account of their solubility in water, facilitating the cleansing of the tube (*see* 723).

The tube should be introduced well up to the sigmoid; if the fluid fails to flow, it is often due to the folding of the tube upon itself, a difficulty which will be promptly overcome by the withdrawal of a few centimeters. Attached to the tube should be a glass funnel which should always be filled, lowered and then raised until the flow begins, in order to avoid the introduction of air. After every introduction, the whole apparatus must be thoroughly cleansed in order to avoid the slightest putrefaction, and it is also well to pass warm water through the apparatus before the introduction of the tube, in order that it may be warmed to the temperature of the body; otherwise the last portion of the nutrient enema becomes cold and produces intestinal irritation. The temperature of the enema should be that of tea or coffee as taken by mouth. If this procedure cannot be strictly carried out by a member of the family, a nurse should always be secured to give the enemata.

The patient should always remain upon his back, and all tendency to cough or sneeze must be overcome as far as possible. The application of a pad or sponge to the anus, after the injection is given, will often prevent its ejection. As to the frequency with which these enemata can be given, we may say that a patient is rarely found who can retain more than three daily, and that for the best results, the day should always begin with a cleansing enema, consisting of soapsuds and some bland material like gum arabic. One hour should always intervene between the cleansing enema and the first nutrient enema. If the slightest odor of putrefaction is detected in the ejected material, boric acid should be added to a cleansing enema in the proportion of one per cent. If diarrhea is set up, as it sometimes is, absolute freedom from this procedure must be maintained for twenty-four hours, when it may be resumed.

PREVENTION OF ACUTE EXACERBATION—FOODS PERMITTED AND FORBIDDEN.—Whenever a diagnosis of intestinal stasis is made, whether due to adhesions, constricting bands—"Lane's kinks," the most common form—or to constrictions from ulcerous or other processes, special pains must always be taken to prevent the occurrence of the acute exacerbations, described above. This care consists chiefly in attention to diet. All authors call attention to the diminutive undigested fragments which may sometimes convert a slight partial obstruction compatible with a fair state of health into a sudden and complete obstruction. Even a fragment of lettuce leaf, according to Schmidt, has caused complete obstruction. We must therefore eliminate from the diet all articles of food which contain large portions of undigested material like cellulose or improperly masticated fragments which may work their way to the obstructed portion. Such articles con-

sist of raw fruit, berries, grapes and raisins, prunes, sauerkraut, cabbage, lettuce, cucumbers, pickles, mushrooms, graham bread, unsifted oatmeal, skins of apples, pears and peaches, and underdone meat. In place of the raw fruit, one should always give sauces like apple sauce, or jellies which are always strained, but never marmalade.

The carbohydrate portion of the food should consist of vegetables which can be mashed, like potato and squash, or finely chopped like spinach; sugar, white bread or Zwieback. Fats must always be of low melting point, like butter, cream and olive oil; bacon, as well as mutton and beef tallow, must always be forbidden. Meats must be restricted to those which are free, or have been freed from gristle and coarse fibers or bits of bone; calves' brain and chopped meat or fish are to be recommended. Coffee, tea and grape juice mixed with plain water are to be chosen as drinks; no carbonated drinks are permitted on account of the danger of overdistention of the intestine.

The diet may be modified to a certain extent, according to whether the obstruction is in the small intestine or in the large. If in the small intestine, since chyme persists in its liquid state until it reaches the cecum, considerable obstructions can be overcome by this liquid or pasty content, so that fermentative and putrefactive processes are much less to be feared.

Our plan of diet, then, must be directed to giving much of the food in the fluid or semi-solid form, excluding as far as possible all substances which are soluble with difficulty; furthermore, we must avoid foods which are easily subject to fermentation or those which are already fermented, like buttermilk and kumiss.

The matter of arranging a diet when the hindrance is in the large intestine, is much more difficult. In this portion of the intestine the feces become thickened, and if there is much loss of fluid from the tissues, this thickening becomes much more pronounced; no matter how much fluid we may give our patient to drink, the heavy consistency of the fecal material persists. Hence, here especially must be avoided such articles as are easily susceptible to fermentation or putrefaction because stimulation of the peristalsis is very likely to drive undigested fragments into the narrow opening of the intestine, or where the peristalsis is impaired, these masses are liable to accumulate until a temporary obstruction occurs. This is particularly true where such vegetables as lentils, peas, beans and asparagus are employed, which are very rich in indigestible cellulose.

It is, therefore, clear that, apart from excluding these materials, such foods must be chosen as have a tendency to maintain the liquid character of the feces as far down the intestine as is possible, and such, as we have

learned, are the sugar group, maltose, lactose, honey, etc. Unfortunately, glucose, cane sugar and maltose are very susceptible to fermentation when absorption in the upper intestine does not promptly occur, and hence the gases produced by such are also deleterious to the intestinal activity. The fruit juices, however, do not possess this disadvantage nor do the fatty acids, so that the diet should consist very largely of butter and cream, and should contain as well orange and grape juice, together with a liberal portion of fruit jellies.

A mixed diet is as desirable as in health, so that we choose chopped meats and fish, salted fish being particularly advantageous on account of the therapeutic effect of the salt drawing the water from the blood to the intestine, which tends to keep the feces liquid. Sweet milk has not been found as desirable as buttermilk or predigested milk, which, by warming, can be freed from the contained gases.

Chronic Intestinal Stasis Without Operation.—It is a well-recognized fact that constipation, one of the most prevalent ailments of the human race, is in many cases purely functional, whereas in others it has a pathological basis which consists largely of adhesions between the intestinal peritoneal surface and that of the abdominal walls. These adhesions are, in general, most pronounced at the cecum or hepatic and splenic flexures of the colon and sometimes at the sigmoid. Such adhesions unquestionably produce a delay in the fecal current at these sites, accompanied by various symptoms which are sometimes ascribed to reflex irritation of the nervous system, and sometimes to auto-intoxication by absorption from the stagnating fecal masses. They often exist over long periods without producing the acute exacerbations described, but may at any time result in a temporary acute obstruction, which fortunately is generally overcome by mild laxatives and temporary abstinence from food. Whatever their origin or their cause, it is unquestionably true that the patient's condition may be alleviated by means of dietetic treatment. In order to place this dietotherapy upon a firm basis, we must consider a little more carefully the theories as to the production of the symptoms.

Nothnagel declares that these obstructions act through reflex influence upon the vagus and the sympathetic system in such a way that there is an alteration of the heart's activity while the blood distribution is disarranged through the reflex paresis of the cardiac vagus and the splanchnic nerve. As a result of the temporary paralysis of the vagus, we have an increased frequency of the pulse and now and then a temporary bradycardia; as a result of the paralysis of the splanchnic, there is an excess of blood in the abdominal organs which causes the pallor, the coolness of the skin, the

soft pulse of little force and volume, and possibly the dizziness and faintness due to anemia of the brain.

In contradistinction to this reflex theory, we have that of auto-intoxication as a positive agency in producing the symptoms associated with intestinal stasis. What the definite poisonous substances are, whether toxalbumins or toxins, science has been unable to discover positively by extraction of the stagnant intestinal contents. All known products of carbohydrate fermentation and protein putrefaction, with the exception of sulphuretted hydrogen and methyl-mercaptan, which fortunately are found in only minute quantities, are harmless to the animal body. Repeated injections of animals with those products of the feces soluble in alcohol and insoluble in alcohol, have always failed to prove uniformly poisonous. Furthermore, after experimental production of ileus in animals, their blood serum injected into normal ones has failed to produce distinct toxic effects. Experimentation has proved, however, that wherever delay in the normal fecal current takes place, abnormal amounts of fluid are poured into the intestinal canal, thereby depriving the blood of that amount of fluid and producing—according to the authors engaged in these experiments—a corresponding anemia of the brain.

DIET IN INTESTINAL STASIS WITHOUT OPERATION.—Based upon these considerations, the diet must be so arranged that the tendency to stagnation is overcome by employing articles which stimulate peristalsis and also those which are readily absorbed, thereby furnishing as little residue as possible for putrefaction. Furthermore, every effort should be made to increase the absorption of water and other fluids into the circulatory and other vessels. Since it is shown by X-ray examination that the fecal contents do not begin to solidify until the region of the mid-colon is reached, our effort must be directed toward extending the point at which this solidification takes place. Much cellulose, for this reason, is distinctly objectionable and all articles of food which consist largely of this material must either be rejected or else so thoroughly comminuted that they do not add to the delayed passage of the feces. While all coarse articles of food, like pickles, olives, bran bread, cabbage and lettuce, are unquestionably valuable in purely functional constipation, they are emphatically out of place where this constipation is produced by the above mentioned adhesions. On the contrary, in order to stimulate peristalsis we must rely on fruit juices or easily digested fats, like cream, butter and sweet oil, to accomplish our purpose.

DETAILS OF DIET.—In general, we may say that the diet must be largely fluid or at least semi-solid, leaving as little residue as possible and

containing the fewest possible ingredients which will undergo either fermentation or putrefaction. Expressed in more specific terms, all those vegetables which have large watery contents, like cucumber, fresh fruit or berries, must be avoided as well as the fermenting beverages, like cider, champagne or the carbonated waters, including the prevalent soda water.

Sugar, however, maintains a unique position in the dietary, since on account of its rapid absorption it rarely reaches the lower ileum and colon where fermentation is most active; in addition, its caloric value makes it an almost absolutely necessary ingredient of the daily dietary. Furthermore, the finely divided carbohydrate foods, like white flour, cornstarch, well-sifted oatmeal and cornmeal, are to be recommended for the same reason that their rapid conversion into glucose and prompt absorption render them unlikely to undergo fermentative processes; naturally, the bread made from such materials should be eaten stale, and the crust thoroughly masticated. Meat, although of great value in maintaining the nutrition of the patient in this condition, has its great disadvantages in that when improperly divided or masticated it becomes a source of marked putrefaction, as indicated by the indol content of the stools and indican in the urine.

While it is recognized that *protein* derived from milk and milk products does not undergo this putrefaction, the same is not true of eggs, which form a valuable source of the protein supply. The number must not exceed six per day, however, or they will exert their deleterious effect either in increasing the putrefactive products in the intestinal canal, or as some believe, producing a species of anaphylaxis because undigested portions are absorbed and exist in the blood current as foreign protein.

In order to overcome these disadvantageous effects of the protein, it is often wise to replace a portion of the native albumin by predigested albumin, either animal or plant, in the form of laibose and somatose or Witte's peptone. These products are to be particularly recommended when examination of the urine shows an increase in its indican content. Plant protein, as derived from cereals, shows little or no tendency to putrefaction and hence in these cases should supply the protein needs of the body to a much larger extent than in an individual with normal intestinal digestion and absorption.

The *fats* are of enormous value in maintaining the nutrition of the patient suffering from intestinal stasis, but must always be employed in the most assimilable form, because of the fact that long delay in the intestinal canal with production of fatty acids may cause undue irritation above the point where the fecal current is delayed, producing a catarrh

accompanied by diarrhea. As suggested above, the fats of the food should be made up largely of cream, butter, olive oil and sweet almond oil; there is no objection, however, to the composite fats known as cottolene, etc., provided they are entirely free from rancidity. Oleomargarin is not advisable on account of its high melting point and slow absorption.

Naturally, the most ideal nutritive material in cases of intestinal stasis is *milk*, both because it leaves but little residue and does not undergo putrefaction. Unfortunately, it is not suited to all individuals, sometimes causing dyspeptic symptoms like pressure, belching, abdominal distention, and often mild colicky pains. When these unpleasant symptoms occur, milk can be made more assimilable by the addition of malt or malt preparations or the above mentioned ground toasted bread.

The diet can also be enlarged by the employment of the various gruels prepared from flour, oatmeal or cornmeal with water or milk, or clear soups, to which ground barley, rice or wheat flour may be added, as well as the various fruit jellies which are either prepared at home or can be procured in all markets.

Gelatin also provides a very satisfactory and important ingredient in the diet, and its inability to replace the protein of the body can be overcome by the use of a moderate amount of meat, as in calves' foot, pigs' foot and chicken jelly. Calves' brains, with egg, as commonly prepared in the South, also provides a very palatable and highly nutritious form of protein food, well adapted to the conditions under consideration. Minced fish or fish hash can likewise be well cared for by the impaired intestinal activity; also vegetable purées, such as mashed potato or squash and chopped spinach, can always be employed without difficulty. Young green peas may be employed, but never dried peas or dried beans, except, perhaps, ground and in purée; even then, the tendency to produce flatulency renders them decidedly objectionable when this condition is present. Cocoa, especially prepared with milk, can be used to advantage on account of its pleasing flavor and its great nutritive value.

Special warning must be given the patient against the use of vegetables containing large amounts of cellulose, such as dried lentils, peas, beans, asparagus, celery and radishes. Lettuce, olives and cucumbers add an entirely unjustifiable risk to the diet of patients suffering from this disease.

Combe, in his work on "Auto-Intoxication," places great importance upon the *preparation of food* and suggests that, as asepsis of surgery is accomplished by sterilization, intestinal asepsis can be brought about by the *elimination of putrefactive microbes* which enter the tract through

uncooked food. Hence, he suggests that raw articles of food should be absolutely excluded on account of their tendency to introduce innumerable bacteria. He declares that in spite of washing raw vegetables, such as lettuce, radishes, watercress, etc., as well as fruit, such as berries, grapes, cherries and plums that are eaten with the skin, they are without exception soiled by dust, earth, manure and fecal matter, which very frequently contain obnoxious microbes. This restriction, according to him, also applies to meats which should always be taken thoroughly cooked and never rare or underdone. He carries his regimen rather to the extreme, in insisting that water must always be boiled unless shown to be free from bacteria by chemical examination.

Another theory has been advanced that, since putrefactive bacteria flourish in an alkaline solution, and rely largely on meat and egg for their culture medium, we may, by changing the character of the residue or reaction in the lower intestinal tract, inhibit the growth of these organisms, hence, exclude their products. Experimental investigations have shown that the putrefactive products are distinctly decreased when the meat and egg regimen is emphatically diminished and reliance is placed upon milk and cheese as well as upon vegetable protein. This restriction or inhibition of the putrefactive bacteria has been found to be due, not to the proteins of the milk *per se*, but to the presence of lactose, or better still, to the lactic acid which is derived from it in the intestinal canal.

Still more effective is the use of the fermented milks by which the lactic acid is taken directly into the stomach. This is accomplished by employing sour milk allowed to curdle spontaneously; this, of course, does not contain the pure culture of lactic acid bacilli but various other acids, like butyric and succinic acid, which have much the same effect. Another method is the employment of milks fermented with special bacteria such as *yooghurt*, *kumiss*, etc. Buttermilk, also, such as is sold at most of our soda water fountains, is equally effective in checking the growth of putrefactive bacteria in the intestinal canal.

The carbohydrates, too, form powerful adjuvants to this inhibition of putrefactive growth. Among these, the sugars, maltose, milk sugar and cane sugar are the most easily obtained and best adapted to our purpose. Beyond the use of sugars, we find that readily digested starches, such as cornstarch and the finely divided flours of barley, rice and wheat, are equally effective in accomplishing this purpose.

Grouped together, these two elements, milk and cereals, form the lacto-vegetarian diet¹ which has proved so effective in clearing the intestinal

¹ See Volume II, Chapter XVI, page 521.

tract of putrefactive bacteria. The only disadvantage of this diet is the fact that its protein elements are deficient and must be reinforced by that constituent from some other source.

As meats have proved to be most effective in encouraging putrefaction, and eggs less so, though not entirely free from this quality, it is best to employ a moderate amount of egg in our protein dietary, particularly the yolk, which has been found to be more advantageous, since it contains little nitrogen but is rich in fats.

PREPARATION OF FOODS.—In the preparation of foods, to accomplish our purpose of checking putrefaction, which so often accompanies delay in the intestinal canal, induced by adhesions, we must follow a certain regimen both in order to render the food palatable and to secure the variety without which the patient will acquire a distaste for it.

The gruels can usually be prepared by boiling the cereal flours for twenty minutes and then adding fresh butter before they are to be served. The second method is to prepare the gruels with milk so that their nutritive value will be enhanced; to do this, the flour is boiled with water as in the previous case, and after thorough cooking, from one-fifth to one-half the quantity of hot milk is added. When either of these causes discomfort, we may prepare the gruel with predigested flours, in form of the preparations of Nestle and Mellin. Four large tablespoonfuls of the predigested food are stirred up with about a cup of water, beginning with small portions until a paste is produced and then adding the balance to the water gruel; this is then to be boiled ten minutes, when milk may be added after the gruel is cooked. Another form is the so-called vegetable bouillon, which can be prepared from carrots and potatoes, of which two ounces, finely chopped, are to be mixed with an ounce each of turnips and dried peas or beans and this cooked in a quart of water for four hours, adding water as it boils away; when this is complete, we add to it a teaspoonful of salt for each quart of bouillon. To render this more nutritious, any of the various rice, barley, oat and bolted flours may be added in the proportions previously mentioned. Such broths are much more palatable and agreeable than those made with water, but they are less digestible and should not be used at first after the acute exacerbation.

Another excellent method of carrying out our anti-putrefactive dietary is to cook noodles, macaroni, spaghetti or vermicelli for half an hour in water to which salt is added; after thoroughly cooking, the water is drained off and butter added before serving, but no spices, tomatoes or cheese, as is the common custom.

Puddings can be prepared with milk, which may be diluted one-half

with water, when patients declare that milk does not agree, adding sugar, yolk of egg, rice, tapioca, arrowroot or cornmeal. This is the only way in which many patients can tolerate milk. After being prepared, this should be cooked in a hot oven for twenty to twenty-five minutes; no flavoring extract, like nutmeg, lemon or vanilla, should be added.

When the intestine has become less irritable, as the outcome of a previous farinaceous diet, we may modify this by the addition of more nutritive substances and a greater variety of foods. If the previous regimen is employed too long, the intestine becomes more sensitive and susceptible to changes, and evidences of mild acid intoxication may appear. We should not, however, add to the diet until the attacks of colic have ceased and the patient's general condition is improved. The additions consist largely of the use of lentils, peas, beans, lima beans in the form of purée, and baked custards.

No fluid should be taken with these meals and at least five meals daily should be employed, as, where smaller meals are used, the products of protein digestion are much more rapidly absorbed and less liable to reach the colon, where putrefaction takes place. Fresh, fully ripe fruits, such as grapes, peaches, plums and pears, are to be added gradually, carefully rejecting the skins. One of the most satisfactory of fruits is the banana, on account of its ready digestibility and the fact that the greater part of its starch has already been converted to sugar. It is desirable that the fruits should be given between the solid meals, for instance, at 11.00 A.M. and 4.00 P.M., because, when eaten with other articles of food, such as meat, they are liable to retard its digestion.

The following diet list presents these suggestions in succinct form:

DIET LIST FOR AUTO-INTOXICATION

<i>On rising:</i>	Calories
A tablespoonful of milk sugar dissolved in a glass of water.	120
	— 120
<i>Breakfast—8 A.M.</i>	
Two tablespoonfuls of cooked or raw fruit, or two apples, pears or oranges.	140
Two slices of toast or stale bread (white) with.	140
Two balls of butter or jelly.	160
Two eggs, either dropped on toast, or.	150
Two eggs with bacon cooked until crisp.	140
Weak tea or caffeine free coffee (Café des Invalides), or cocoa with one tablespoonful of cream.	80
	— 810

	Calories
CALORIES BROUGHT FORWARD.....	— 930
<i>Lunch</i> —11 A.M.	
A glass of buttermilk, made with lactone tablet, predigested, kept from 18 to 24 hours in a warm place, with which.....	80
A couple of crackers may be taken if desired.....	60
	— 140
<i>Dinner</i> —1 P.M.	
A soup plate of any milk soup, potato, cream of celery or mock bisque, but no bouillon.....	160
A small slice of roast or boiled meat, fowl or lean fish (the latter two to be preferred when they can be obtained); no gravy.....	70
Four tablespoonfuls of any vegetable, including tomatoes.....	160
	— 390
Salads, of chopped spinach or cauliflower, which may be prepared with either a tablespoonful of oil and vinegar or lemon juice.....	160
At every dinner, potato in some form. Also:	
Two tablespoonfuls of a light pudding, as rice, custard, sago or tapioca.....	160
One tablespoonful of cream (light).....	30
One teaspoonful of sugar.....	30
	— 380
<i>Tea</i> —4 P.M.	
Another glass of buttermilk.....	80
	— 80
<i>Supper</i> —7 P.M.	
Four tablespoonfuls of porridge, made of rice, Indian meal, wheatina, cream of wheat, Ralston or malt, with.....	140
One tablespoonful of cream, and.....	30
One teaspoonful of sugar; or.....	30
An omelette (two eggs); or.....	230
A vegetable salad, as above (one potato equivalent).....	210
Cream cheese.....	130
Two slices of stale bread or toast.....	140
One ball of butter.....	80
	— 990
<i>At bedtime:</i>	
A hot hip bath, followed by one or two crackers.....	60
Half glass of Rhine wine or cider.....	80
	— 140
TOTAL.....	— 2,930

Chronic Intestinal Stasis After Operation.—The operative procedures for adhesions, kinks and other mechanical causes of intestinal stasis are either the freeing of adhesions, or in many cases, the union of two adjacent portions of the intestinal tract, thus short-circuiting the point of obstruction. When the adhesions are in or about the cecum, or in the ascending or transverse colon, the practice has sprung up of either uniting the

cecum with the sigmoid or implanting the ileum into some portion of the transverse colon. This procedure has two disadvantages, in that it often produces a temporary if not persistent diarrhea, which must be combated by dietetic activities, or the fecal material remains in the short-circuited portion of the cecum and colon, still exerting its malign influence.

It has been my personal experience that one year after an ileocolostomy, without the expected relief, an excision of the unused portion of the colon showed marked concretions of fecal matter which had not escaped during this long period.

DIET IN CHRONIC INTESTINAL STASIS AFTER OPERATION.—If the operation has consisted only in severing adhesions, our diet for a short period after surgical procedure will be largely that suggested for acute exacerbations without operation; in other words, it must be made up entirely of liquid foods, to be rendered as nutritious as possible by the addition of well-ground meals obtained from cereals. Water gruels or water and milk gruels are to be employed together with light custards, gelatin, or bouillon to which thoroughly ground bread crusts have been added. Fruit juices, like orange, grape or grapefruit, may be employed, and very often a spoonful or two of some fruit jelly will be heartily appreciated by the patient without causing untoward results.

If there is post-operative vomiting, or if overdistention of the abdomen takes place (one of the common consequences of laparotomies), no food whatever should be given and the thirst should be combated with lumps of ice. If the condition persists unalleviated, we must rely wholly upon rectal feeding. As a general thing, however, this period, even if it occurs, is of short duration and after the first precautionary four or five days of liquid feeding, we may proceed to the employment of soft-boiled eggs, milk toast, oyster broth, calves' brains cooked with egg, the various mushes made of sifted oatmeal or cornmeal with cream and sugar, a little finely ground steak, which should be broiled by preference and served with butter, bowl custards and purée of potato or squash. From this point on, if the peristaltic activity of the intestine has been restored, we may proceed to the general diet, with due caution as to the over-employment of protein in the food. The persistent use of buttermilk, fruit juices, cream and butter always repays us in our efforts to overcome any return of the intestinal putrefaction and in the diminution of the colicky pains; as for a long time after operation any tendency to fecal accumulation will bring back, in a slight degree, those fugitive colics which not only discourage the physician, but make the patient fear that operation has been useless.

Whenever ileocolostomy is the operation of choice, though the stasis ceases, we have very often the presence of a persistent and annoying diarrhea, which reduces the patient's strength and prevents rapid and complete convalescence. This diarrhea does not seem to be produced by an enteritis, if one can judge from the examination of the feces, which usually contain representatives of the three varieties of food—fat, protein and carbohydrate. It has seemed to the writer, that at times fragments of starch predominate, but mucus is not at all a prominent constituent of these liquid stools. They are usually yellow, often of acid reaction, and rarely present any putrefactive odor. They would seem to be due to an exaggerated peristalsis of the small intestine, induced by the fluid character of its contents; the exclusion of the colon allowing no or little opportunity for absorption of the watery constituents.

In the dietary, therefore, all articles which hasten peristalsis must be excluded. These comprise all foods which contain much residue, as coarse breads, like graham and whole wheat; fruit and vegetables with skins, like peas, beans and lentils; as well as lettuce, celery, radishes and cucumbers. For the same reason, we are compelled to eliminate from the patient's diet those articles which through their chemical character act as laxatives. Therefore, we must forbid the organic acids and salted foods, and particularly buttermilk, whey, vinegar; condiments like mustard, pepper and Worcestershire sauce; sardines, salt herring; as well as anything with more than limited amounts of sugar; and acid wines.

On account of the well-known unfavorable effect of cold drinks on intestinal peristalsis, we must exclude beer, champagne, lemonade, etc., which are always given iced, also ice cream. On the contrary, we urge the employment of all those articles of food which have the power of limiting intestinal secretion and ordinarily produce constipation. To this group belong those cereals which, when cooked, produce slimy mixtures, like gruels made from rice, barley, wheat and oatmeal flours. We may employ further, those berries which contain more or less tannic acid, such as huckleberries, elderberries; and also the Bordeaux wines.

Meat must be carefully freed from all portions of gristle, or better, those forms excluded which are made up largely of this objectionable material, such as roast beef, goose, duck, pork and mutton. All meats should be finely chopped and either broiled or boiled; all smoked meats and fish as well as ham must be strictly forbidden. It is well to put the meat through a meat cutter before cooking, or to enjoin upon the patient or nurse the necessity of cutting the meat up very fine before it is eaten, much as we do with small children. This condition does not necessitate

any serious restriction of the amount of meat given, since ordinarily there is no danger of return of the auto-intoxication.

Protein, either in the form of meat, mild cheese or egg, is particularly desirable where the stools are frothy due to fermentation of starch, the microscope showing numerous starch granules, easily detected by the addition of Lugol's solution.

The carbohydrates are usually badly borne, as the extensive use of the sugars—milk, fruit or cane—usually increases the diarrhea. All vegetables containing large amount of cellulose, such as potato and turnip, even though thoroughly cooked, are to be avoided on account of their tendency to stimulate peristalsis. Toast and Zwieback, however, may be allowed, but pies, puddings and other foods containing large amounts of sweetening must be omitted. For variety, vermicelli and macaroni may be used. The digestive ability of the patient for omelettes must be carefully tested. Bouillon may be employed to advantage, and may have added to it the before mentioned flours, oats, barley and rice.

The employment of fat must be carefully watched where diarrhea is present, since it is well known that large amounts of fat stimulate peristalsis. It is wise to confine the use of fats to butter, cream, and possibly a little sweet oil. It goes without saying that the butter must be unsalted or fresh, and free from the slightest trace of rancidity. All other forms of fat, like lard, as well as the heavy gravies, must be absolutely forbidden.

Special care must be exercised in the employment of milk, as in the diarrhea following ileocolostomy, milk is often badly borne, exaggerating the frequent discharges and causing distention, borborygmus and sometimes pain. Even the addition of lime water will not check these disturbances following its use, and there are patients who cannot take custard or ice cream without similar disturbances. In other patients, milk forms a very pleasing and soothing form of nutrition, with a clear tendency to check the diarrhea and improve the nutrition. One great advantage in the employment of milk is the fact that its proteins, especially casein, show no tendency to putrefaction in the intestine, and indican is never increased under its use.

When after repeated attempts the patient is found to possess such idiosyncrasies with reference to the ingestion of milk, it is useless to continue it further and its omission for a few weeks may, in the end, allow us to resume its employment without discomfort.

It is a self-evident fact that all vegetables must be given mashed or as purée, after being thoroughly cooked, so that their cellulose will not

incite increased peristalsis. All condiments are to be strictly excluded, and it is better for the time to use saccharin in place of sugar for sweetening. As beverages, we may employ tea and decoctions of cocoa shells, prepared with milk, but coffee must be wholly excluded from this list. An equal evil is ice water, or in fact any iced drink, which exerts its influence almost immediately after ingestion by movement of the bowels. It is well, too, to restrict the volume of fluid taken, to a liter (four cups) daily, because, while the excessive use of fluids does not overcome constipation, it invariably exaggerates the diarrhea.

An increase in the variety of foods allowed must take place very slowly and only when, on examination of the stool, no considerable residue from this added article of food is found.

These suggestions have been combined in the following diet list, which, it is to be understood, is only a skeleton to which other articles of food of the same general character may be added as need arises:

DIET LIST AFTER ILEOCOLOSTOMY

7 A.M.

Toast, one cup of Philip's cocoa (not chocolate), which may be sweetened with saccharin, but no sugar.

10 A.M.

Two dropped eggs on toast or a saucer of well boiled rice with milk.

12 M.

Chicken soup freed from fat (skimmed) with rice, barley or flour cooked in it. Very little salt. Hamburger steak (made from good round and all coarse parts picked out), broiled or baked. Macaroni with a little cheese and a small glass of currant or Sherry wine.

3 P.M.

Toast and a cup of tea with milk, but no sugar.

Supper:

Minced fish or chicken on toast.

The patient must not take any sugar, butter, salty articles, fruit or coffee; no pepper, mustard or candy. Drinks must be limited to six cups or glasses during the day. No iced drinks can be taken. A warm bandage of flannel must be worn over the abdomen, and rest in bed is most important.

BIBLIOGRAPHY

- BAINBRIDGE. Chronic Intestinal Stasis, 1914, Reprint, New York.
 BOAS. Darmkrankheiten, Leipzig, 1896, p. 345.

- EWALD. Diet und Dietotherapie, Urban und Schwarzenberg, Berlin und Wien, 1915, p. 361.
- HAYES. N. Y. Med. J., Jan. 24, 1914, p. 172.
- HEMMETER, JOHN COHN. Diseases of the Intestines, pub. by Blakiston, Philadelphia, 1903, vol. ii, p. 206.
- KELLOGG. N. Y. Med. J., Sept. 12, 1914, p. 504.
- LANE. Brit. Med. J., May 4, 1912, p. 993.
- LESLIE. Amer. Pract., August, 1913, p. 416.
- MANCINI. Il Polielin., Anno XIII, Fasc. 6, 173, Untersuchungen über den Nährwerk der Gelatine, etc., quoted from Arch. f. Verdauungskr., 1907, Vol. 13, p. 326.
- MAYR. Studien über Darmträgheit, Karger, Berlin, 1912, p. 267.
- OSBORNE. Handbook of Therapy, 3d ed., J. Am. Med. Assn., Chicago, p. 263.
- PENZOLDT und STINTZING. Handbuch der Therapie der innere Krankheiten, pub. by Fischer, Jena, 1903, p. 547.
- PICK. Magen und Darmkrankheiten, pub. by Deuticke, Leipzig und Wien, 1895, p. 157.
- SCHMIDT. Klinik der Darmkrankheiten, Bergmann, Wiesbaden, 1913, p. 579.
- SMITH, GEORGE CARROLL. What to Eat and Why, pub. by Saunders, Philadelphia and London, 2d ed., 1915, p. 253.
- ZWEIG. Magen und Darmkrankheiten, pub. by Urban und Schwarzenberg, Berlin und Wien, 2nd ed., 1912, p. 424.

CHAPTER XXIV

DIET IN THE DISEASES OF CHILDREN

LE GRAND KERR, M.D., F.A.C.P.

Symptoms and Diseases: Vomiting; Colic; Cyclic Vomiting; Indigestion; Constipation; Congenital Dilatation of the Colon; Acute Gastroenteric Infection; Intestinal Indigestion; Ileocolitis; Mucous Colitis; Fissure of the Anus; Stomatitis; Chronic Dilatation of the Stomach; Acute Gastroduodenitis; Peritonitis; Tonsillitis; Acute Rhinitis; Epistaxis; Catarrhal Spasm of the Larynx and Acute Catarrhal Laryngitis; Bronchitis; Asthma; Influenza; Pleurisy; Lobar Pneumonia and Bronchopneumonia; Tuberculosis; Diseases of the Heart; Purpura; Hemophilia; Nephritis; Pyelitis; Lithemia; Rheumatism; Chorea; Eczema; Urticaria; Chronic Secondary Anemias; Chlorosis; Leukemia; Rachitis.

GENERAL CONSIDERATIONS

General Considerations.—Many of the diseases of adult life can be directly traced to dietary or nutritional faults during childhood and the course of many other diseases is dependent upon the same faults. The best life insurance offered to the adult is a healthy, normal childhood development particularly along nutritional lines.

It is true also that the majority of instances of disease in infancy can be treated through dietetic adjustment with little or no medicine. This is not so true of later childhood although during that period a great deal is accomplished by dieting without medication.

The larger rôle of diet in infancy and childhood is preventive rather than curative for upon its diet the child depends largely for continued health. The correct diet is all-important because it is individualistic. Almost any one can in time master the well-known facts in regard to diet and dietetics to be gleaned from books, but for practical application a broad clinical experience is necessary. Generalities and principles ordinarily applicable to the average child are influenced by individual peculiarities, so that each child becomes a law unto itself.

The child's metabolism is much more active than the adult; he consumes more of the different elements of food and also destroys much larger quantities. This is because continued growth and development must be provided for as well as waste.

Before taking up the discussion of the diet in definite disease in children, it may be well to consider certain symptoms which may or may not be due to actual disease.

SYMPTOMS AND DISEASES

Vomiting.—Vomiting of a mild degree, sometimes designated as "eructation," occurs in healthy infants, the returned food exhibiting no change in consistency or odor. Thus we know that the act is probably a conservative one, occurring without preceding nausea or any appreciable effort upon the part of the infant. In practically every instance it is due to overfeeding or too rapid ingestion of the food. The notion that it is a necessary part of every baby's dietetic career should be corrected because the influence of habit is very strong early in life and this habit once formed is difficult of correction.

Unless habit has been formed, attention to the two causative factors results in its discontinuance. Overfeeding is evidenced by the vomiting of food unchanged or changed but little. Too rapid feeding is easily demonstrated by timing the ingestion of a measured quantity. Irrespective of overfeeding or too rapid feeding, pressure over the infant's abdomen, or what is just as bad, tossing and exciting the infant soon after feeding, will cause vomiting.

When the act of eructation is accompanied by facial grimaces (the infant seeming to go through the act of swallowing, immediately preceding the bringing up of the food) we may be sure that eructation is due to habit. Remembering this, we will not be misled when vomiting persists, following some definite disturbance of the digestive system. I mention this because it is a common experience to find children unnecessarily dieted and their nutrition after acute digestive disease more or less seriously interfered with under the mistake that the persisting vomiting is still due to disease when it is in reality due to habit contracted during disease.

Vomiting which occurs when the stomach is nearly empty is not usually amenable to dietetic correction because most often it is indicative of intestinal parasites and in such instances is usually relieved by the ingestion of food.

Pharyngitis by rendering the mucous membranes hypersensitive,

respiratory disease accompanied by the production of tenacious mucus, and sudden or prolonged eye strain with accompanying refractive error, all cause vomiting that is not relieved by dieting. When a child has recently (within a few weeks) suffered from pertussis and acquires bronchitis, the recent acquisition seems to have some influence in bringing back the tendency to vomiting which was evident during the pertussis and this does not yield to diet.

Vomiting which occurs a considerable time after the meal is most frequently due to retention by the pylorus of the undigested food in the stomach. It will be necessary to determine whether there is disease or malformation of the stomach or if the food is improper (actually or through some idiosyncrasy). In either instance the diet must be adjusted to prevent the condition becoming chronic with subsequent wasting.

Occurring in breast-fed infants, it is necessary to examine the mother as well as the infant. Often the cause will be found in a faulty diet of the mother, particularly the ingestion of foods which are not easily digested by her, the taking of alcohol, or the long retention of waste products in the bowel. Tranquillity of mind may at times be important, but my experience has led me to believe that more often the baby is upset because of the physical fatigue of the mother. Proper diet combined with adequate rest is what immediately improves these cases and one without the other usually means failure.

Examination of the breast milk is not usually satisfactory. In the same woman, the breast milk will vary at practically every nursing and is neither constant for one day nor from day to day. This detracts from the value of its examination and even if such laboratory tests prove a "perfect" milk, it does not prove that it is the proper food for that baby. The best test is not the laboratory but the nutrition of the infant.

If the proteins are too high, usually evidenced by vomiting, curdy stools, colic and flatulence, the milk may be diluted by giving a suitable amount of plain water or a mixture of fats, sugar and water before each breast feeding. The mother should be given more farinaceous and vegetable food and adequate exercise. If the vomitus is sour, or fat globules show in the stools, the mother's diet should be reduced. Vomiting occurring in acute disease can usually be controlled by adjustments of the diet¹.

Colic.—Colic is more common in breast-fed than in artificially fed babies if the formulae are anywhere near correct and the food is given

¹ See Section I, Volume III, Chapter XI, Diet in Infectious Diseases.

at the proper intervals and the proper temperature. This is so probably because the artificial feeding is more constant in composition and is uninfluenced by the physical and mental condition of the mother. Despite the common belief, it is quite unnecessary for a baby to have attacks of colic during the first three or any other months of life. Colic, while usually due to a dietetic fault, may be caused by other conditions, every one of which may be corrected and the infant's digestion allowed to proceed comfortably.

Cyclic Vomiting.—Cyclic vomiting is a very difficult condition to manage because there is still much uncertainty as to its cause. I am convinced that it is a form of toxemia independent of the diet occurring in children who are neurotics. While some claim a purely neurotic element in the production of the attacks, the fact that these children are neurotic would readily explain the severity of the attacks and their periodicity, when the eliminative forces have been inactive for a time before the attack. However, its self-limitation suggests the toxemic rather than the neurotic element.

DIET IN CYCLIC VOMITING.—Practically there is no dietetic treatment during the attack or immediately following it. With the onset there is a complete or nearly complete distaste for all kinds of food and in the few instances in which food is taken it is promptly vomited. Therefore during the attack the stomach should have absolute rest. Even the administration of small amounts of water will aggravate the vomiting. This rest of the stomach should continue for several hours after vomiting has ceased and if there is any uncertainty about beginning the feedings the mistake should be made upon the safe side and the food withheld. When feeding is started, the amounts given should be small, one-half ounce of equal parts of lime water and milk or peptonized milk, every one-half to one hour. As rapidly as possible the amounts may be increased and the intervals lengthened. In most instances this increase can be rapid enough to get the child back on its normal diet within twenty-four to forty-eight hours. It is a peculiarity of the condition that after the most severe vomiting for many hours, it will suddenly subside and the child fall into a deep sleep and upon awakening will make insistent demands for food.

During the time that food is withheld, normal salt solution may be given by the rectum and in severe cases it may be used subcutaneously to limit or prevent shock. Nutrient enemata may be given when indicated but that will be only in the more severe or protracted cases. Five per cent solution of glucose by rectum (one to three ounces) may be used in cases with threatened collapse.

Immediately following the attack the insistent demand for food must be and can best be met by a diet low in fat, proteins and very low in sugar. Clinical experience has taught me that a fat-free diet is unnecessary but that the sugars are harmful at this period. Such a diet would consist principally of skimmed milk, cereal waters and vegetables, with perhaps the addition of fruit juice in moderation. This could be very promptly added to so that within two days the child would return to its ordinary diet.

Between the attacks, the diet should be revised. This is apparently difficult because there is no dietetic error which clinically seems to precipitate an attack. Starch indigestion is present in many of these children and with proper control seems to lengthen the intervals between attacks. The real revision of the diet has to do more with the amounts than with the kinds of food. While these children get along better upon a diet which is largely vegetable with lean meat two or three times a week and fish and fruit occasionally, it is over-eating that must be avoided at all times, especially when the child is tired or emotional. Eggs if given at all, should be used very sparingly and the amount of milk that the child takes should be restricted to about one pint a day. Only moderate amounts of sugar should be allowed in the diet.

Indigestion.—ACUTE INDIGESTION AND ACUTE GASTRITIS.—Because so much depends upon the nature of the irritant, no definite line can be drawn between acute indigestion and acute gastritis in young children. It is only as the course continues that the inevitable catarrh helps to distinguish them. In children over the age of two years acute indigestion is practically always traceable to the over-eating of some article of diet. In either instance the dietary demands are the same—the withholding of all food for from twelve to twenty-four hours. Thirst may be relieved by the administration of small quantities of cool, sterile water or cracked (artificial) ice by mouth, or normal salt solution by rectum.

CHRONIC INDIGESTION.—Chronic indigestion is very common after the period of infancy. Its onset is most frequent between the third and sixth years and this may be so because these are the most generally neglected years of childhood as far as its diet goes. The care which was shown during infancy is commonly relaxed after the second or third year and is not considered of much importance until the demands of school life make attention more necessary.

The symptoms are not always those which would suggest that the digestive tract is at fault, so that commonly no adequate dietary adjustment is made until the disease is well established. Lassitude, cough,

nervous symptoms and a host of unrelated symptoms lead one from, rather than to a suspicion of the alimentary tract.

The dietetic care demands a considerable reduction in the carbohydrates. This means that bread, potatoes, starchy foods, jellies, sweets, raw fruits and the vegetables should be reduced to a minimum or for a time avoided altogether. If milk is given it should be diluted.

The diet may consist principally of meat, bacon, fish, custard, junket, cooked fruits, broths, or a vegetable purée. The meals should be given regularly and may be three a day with nothing taken between meals. It is necessary in some instances to combine adequate rest in bed with the restrictions upon the diet. Many of these children are mentally and physically tired out as well as digestively inefficient.

Constipation.—Constipation after the period of infancy is a very common complaint and is the cause of much ill-health. Despite the fact that the belief is very popular and the notion thoroughly grounded, diet has very little influence upon this habit. Commonly, it is the manner in which the food is prepared or the manner in which it is taken that may slightly influence peristalsis and not the food itself. There is little doubt but that sterilized, and sometimes pasteurized milk is constipating and that when these processes are stopped and raw milk substituted some slight improvement is noted. It has not been my experience that a change in the diet alone has much, if any influence.

Many times the credit is given to some apparent correction of the diet when in reality the result was wholly, or almost so, dependent upon the regulation of the child's method of living and particularly as regards its habit of paying no attention to the regularity of defecation. It is not always easy to recognize chronic constipation. Most persons think that constipation exists only when the bowel has not been evacuated as frequently as usual. Constipation exists not alone when the evacuations are lessened in number, but when the act is much more difficult of accomplishment than usual, when the stool is much drier than normal, and when the total amount that should be evacuated is very much reduced. Two or more of these factors may be present in any given case.

In children, habit is the great factor in chronic constipation, so much so that we might well drop the term "chronic" and substitute "habitual." Many of these cases are suffering from fluid impoverishment and not from faulty diet. The habit of drinking water especially first thing upon arising in the morning and the last thing at night is all that is required as far as diet changes go. Considerable harm may come from a sudden change to a coarse diet in children to overcome constipation and by the

change there may be added a flatulent indigestion which will prove more troublesome.

There is no objection to giving fruit with the morning meal, for in a few instances it may do some good, but if the child's stomach tolerates them (and it almost invariably does), olive oil or molasses are really efficient laxative foods. Molasses may be given with the meal; olive oil an hour after the meal. Given with orange or grape juice (teaspoonful to tablespoonful or more of the fruit juice) the oil is readily taken by all children who have no idiosyncrasy to oil. Any attempted dietetic or other management of habitual constipation in children is doomed to failure unless the habit of regularity is immediately instituted and persistently followed up. Nine out of every ten cases are due to habit and nothing else.

Congenital Dilatation of the Colon.—Congenital dilatation of the colon is not amenable to dietetic treatment. Unless the dilatation is moderate, the problem is always a surgical one and nothing is accomplished by diet except as it influences the child's general nutrition or places it in a better condition for surgical interference.

Acute Gastro-enteric Infection.—Acute gastro-enteric infection is commonest in infancy but may attack any child below the age of five years, after which period there is an increasing immunity.

DIET IN GASTRO-ENTERIC INFECTION.—In its management by diet, all milk must be stopped at once. Cereal waters or broth may be substituted, preferably the former. The return to milk should be made with great caution. As the child quickly acquires a distaste for any one food, the cereal waters should be varied. I have found that part cereal water and part broth is most readily taken, or the cereal water may be varied by adding sugar or saccharin.

The real dietetic problem comes after the acute symptoms have subsided. How soon may we return to the use of milk? Usually forty-eight hours after the temperature has become normal and the stools have improved. In other cases the condition of the child demands even an earlier return. The only safe plan is to add a small quantity of skimmed milk to the feeding; not more than two teaspoonfuls at first and cautiously increase this if there is no return of the diarrhea or rise in the temperature. It will be necessary to avoid the temptation to give in to the pleadings of the child's attendants that he is starving, because the danger of re-infection is so great that the addition of even a little more milk than can be taken care of will result in a second condition worse than the first. My experience has taught me to make the increases by drams and not by ounces.

It must be remembered that the return to the usual diet as far as the milk is concerned will be a question of weeks. In those instances in which the intolerance to even small quantities of milk persists, unsweetened condensed milk may be added to the cereal water and gradually increased. In some cases it may be desirable to use one of the several proprietary foods to replace the cereal water. If the infant's nutrition is being seriously interfered with, accessory feedings may be added even as early as the sixth month. Cream of wheat, stale bread, Zweiback, dried crackers, are all valuable additions. While the nutrition is low the usual intervals of the child's feedings may be reduced so that more meals are taken but in no instance should the feedings be forced.

Intestinal Indigestion—**ACUTE INTESTINAL INDIGESTION**.—Acute intestinal indigestion is quite common among children and merits much more attention than is usually paid to its occurrence. The name may be misleading because in going over the histories of these cases it is common to find that what is an acute attack is only an exacerbation of a chronic condition which has received little or no attention. Occurring in either the breast-fed or bottle-fed baby, the indications are for an immediate dilution of the milk or its absolute withdrawal for a short time (twelve hours). In older children the amount and the variety of the food must be at once reduced and the reduction continued for two or three days at least. With these mild dietetic restrictions the attack is usually controlled, but with the warning thus given, the dietary should be modified to limit or control the more serious condition of chronicity.

CHRONIC INTESTINAL INDIGESTION.—Chronic intestinal indigestion is commonly only indicated to the uninitiated by the acute attacks with intervals of apparent health but during which the child is not up to par. The diet must be so restricted as to prevent the acute attacks and to give the alimentary tract a chance to return to normal. I believe that eggs are the most offending article of diet in these cases and they should be prohibited. Meat should be allowed but twice a week and milk should be reduced to a minimum. The green vegetables are most desirable, also cereals. If physical rest (particularly directly following a meal) is added to the restricted diet, improvement will be more rapid.

Ileocolitis—**ACUTE ILEOCOLITIS**.—Acute ileocolitis (dysentery) presents a marked infection of the intestine. Our knowledge of the bacteriology is so limited that during the acute stage we are only able to advise that similar dietetic measures be instituted as in acute gastroenteric infection and with the same precautions. During convalescence the problem of the nutrition is very difficult and each child is a law unto

itself, but the general principle may be stated that these cases bear milk and particularly fat badly. As they stand sugar well, it is desirable to give cereal waters with sugar, with condensed milk, or malted milk. Skimmed milk may be added later. In all cases the increases must be gradual and cautiously made. In those over six months of age, use may be made of Zwieback, stale bread, dried crackers, cream of wheat. When the demand for nourishment is urgent, two to four teaspoonfuls of rare scraped beef may be added daily. Within three or four weeks it should be possible to return to a nearly normal diet. The mother should be warned not to continue the diet of convalescence indefinitely, as is sometimes done.

CHRONIC ILEOCOLITIS.—Chronic ileocolitis is the result of neglected, moderate acute attacks or of the severer forms. The mortality is very high in infancy. If possible to secure it, breast milk should be given to these infants. Otherwise dextrinized gruels with small quantities of skim milk may be used. White of egg may be added to these. In older children, cream of wheat, farina, junket, coddled or raw egg, Zwieback, stale bread, toast, dried crackers, yellow cornmeal and diluted orange juice may be given in small quantities of each but in variety. It is always better to give one-half the quantity of two articles of diet rather than a double quantity of one. The intervals of feeding should be shortened and a short period of physical rest should be taken immediately preceding and after each feeding.

Mucous Colitis.—Mucous colitis is usually aggravated by the use of milk in any form, especially cow's milk, so it should be stopped. In place of it, we may use malted milk or one of the proprietary foods for a few weeks and in addition the child may have well-cooked cereals (especially oatmeal, yellow cornmeal, cream of wheat) the white meat of chicken, rare scraped beef (three days a week), broths fortified with rice or barley, cooked fruits, vegetable purées (made without the addition of cream), fatty bacon (cooked very lightly) and butter. Vegetables are not well tolerated until the case is well advanced toward a cure as evidenced by the disappearance of the mucus from the stools. The child may be encouraged to take freely of butter upon bread or dried crackers.

As the course is usually a protracted one, the management of the diet must be in competent control over a very long period. Acute exacerbations are common and add to the prolongation of the disease.

Fissure of the Anus.—Fissure of the anus, a most painful and troublesome condition in children, will continue despite adequate local treatment until the stool is rendered somewhat softer than usual and kept so for a

considerable period. In the bottle-fed infant this is often accomplished by the addition of one or two grains of citrate of soda to each ounce of the milk in the mixture without any other change in the food. Outside of this measure there is nothing in the dietary line which will accomplish the result desired.

Stomatitis.—Stomatitis presents as its dietetic problem the taking of an adequate amount of food. There is no change in the diet which will influence the inflammation in the mouth, but the pain and discomfort caused by the taking of food compel the child to take much less than is required for its daily needs. If the food can be given to the child cool, it is taken more eagerly.

Chronic Dilatation of the Stomach.—Chronic dilatation of the stomach in older children demands a concentration of the food in the dietary. The amount of milk and fluids should be much reduced and more concentrated foods, as meat, vegetables, cereals and eggs given. Usually these children are large water drinkers and the habit should be broken up by giving smaller quantities (two to four ounces) more frequently between meals and none at meals. The child should be taught also to drink slowly. It will be found that this restriction does not interfere with the child's nutrition although it will with his comfort for a few days. The habit of taking large quantities has probably persisted from infancy and will not be readily broken up without complaint from the child.

Acute Gastroduodenitis.—Acute gastroduodenitis (catarrhal jaundice) commonly occurs between the third and fifth year. It is rare in infancy and unusual after the fifth year. At the onset and before the occurrence of jaundice the diagnosis is not made and the treatment is that which is usually instituted in gastric indigestion.

As soon as the diagnosis is made, the diet should be restricted to skimmed milk or buttermilk, cereals, broths and fruit juices. The articles to be avoided are the fats. Meat and sugar should be reduced to a minimum.

Peritonitis.—Peritonitis demands absolute starvation for the first day or two. During this period nothing but water or a very dilute animal broth may be allowed. Even broth is avoided if possible. After the first forty-eight hours, broths and the cereal waters or gruels may be added but the additions to the starvation diet must always be made most cautiously.

After it has been possible to determine the extent of the peritoneal inflammation, the diet will be regulated according to the age and general condition of the child. The return to the usual diet will be necessarily very slow and the food given, therefore, must be concentrated. After the

first few days, the dietetic management is similar to that of chronic indigestion.

Usually after peritonitis, the digestive capacity is much reduced and great care must be exercised to maintain the child's nutrition and still avoid the acute gastro-intestinal disturbances which are so painful and distressing.

Tonsillitis—MEMBRANOUS TONSILLITIS.—Membranous tonsillitis (septic sore throat) requires the same dietetic management as diphtheria. On account of the frequency with which milk-borne epidemics have been reported, no milk should be given unless its source is known. Even then it should be rendered safe by scalding.

FOLLICULAR TONSILLITIS.—Follicular tonsillitis should be treated dietetically the same as the membranous form but the restrictions need not be so great. Meat of all kinds, fowl and eggs should be prohibited for several days following the attack.

Acute Rhinitis.—Acute rhinitis in children is usually not limited to a single attack but the history will show that the child is subject to "colds." While there is commonly a local cause in the nose or throat which must be corrected before relief may be obtained, it is more commonly the case that the hygienic surroundings of the child are bad and the diet inadequate. To place the child in the proper resistant condition, along with the adjustment of the local and hygienic conditions attention should be paid to the nutrition. Usually these children are underfed rather than wrongly fed and the giving of a more nutritious diet, especially an increase in the amount of milk taken daily, will aid the other measures.

Epistaxis.—Epistaxis in children may be due to local causes which again may be persistent because of a generally lowered tone or may be an evidence, and the only one for a considerable period, of rheumatic infection. In the first instance the diet should be the same as suggested in acute rhinitis and in the second as instituted in rheumatism.

Catarrhal Spasm of the Larynx and Acute Catarrhal Laryngitis.—Catarrhal spasm of the larynx and acute catarrhal laryngitis need a decided reduction in the usual diet for two days following the attack and a gradual return to the normal diet within a week. Before the return to normal it is wise to inquire into the history of other attacks and if these have occurred the lowered nutrition which is commonly evidenced in these children should be corrected.

Bronchitis—ACUTE BRONCHITIS.—Usually with the onset of acute bronchitis there is an immediate reduction in the appetite and if this is not so, the diet should be restricted to fluids because the digestive func-

tions are impaired. For the first two days only moderate amounts of milk, broths or cereal waters should be used but the meals may be made more frequent. Fruit juices diluted with water may be taken freely and to these may be added a small quantity of bicarbonate of soda. Free secretion is secured more rapidly if the fluids are given hot. In the return to the usual diet, flatulent distention of the abdomen must be avoided as it interferes with free respiration. During convalescence the fatty foods should be given as freely as they will be tolerated.

CHRONIC BRONCHITIS.—Chronic bronchitis is not infrequently prolonged by over-eating and as many of the children who suffer from the disease are excessively fat, a restriction of the diet with a reduction in their weight is desirable in addition to the changed hygienic surrounding. While the diet must be nutritious it should not be high in fats or given in the amounts which will put any extra tax upon the digestive tract to take care of it. Many times the withholding of meat, fowl, eggs and animal broths will produce marked results.

Asthma.—Asthma is not uncommon during childhood and to be controlled requires that the whole mode of life of the child and its surroundings be most thoroughly supervised. The parents must be impressed with the fact that the fault is not one of the respiratory but of the nervous system. No settled dietary rules are possible in this affection but the rule is that a non-stimulating diet is best. Meat, fowl and eggs and the animal broths should be prohibited and the diet made up largely of the fats and carbohydrates. It appears at times that certain articles of diet will precipitate an attack in certain children and these peculiarities should be studied and corrected. But irrespective of this special susceptibility, there are other instances in which indigestion will bring about an attack. This feature is so marked as to cause some authors to classify it as "gastric" asthma. Fish should be allowed freely with the more easily digested vegetables, as spinach, potato, asparagus, mashed carrots, etc. Cereals may be used with cream. The evening meal should be very light.

Influenza.—Influenza requires the same diet as is recommended for all acute febrile conditions. During the height of the disease, liquids should be given in small quantities at frequent intervals. Recalling the exhausting nature of influenza and the usually prolonged convalescence, a more or less rapid return to a concentrated, nourishing diet is essential. During this period easily digested or predigested foods may be taken in relatively large quantities. Milk and eggs may be taken between meals. Alcohol given in the form of whiskey is a valuable addition when the pulse is weak and the child refuses to take sufficient nourishment.

Pleurisy.—The diet in this disease has been subject to many and varied changes. Two plans stand out most promising: first, the French plan of an exclusive milk diet which plans to cause absorption of the effusion and increase the excretion of urine; second, the “dry” diet which restricts the quantities of fluid in the hope that absorption will be favored. Each article of diet selected is chosen because of its dryness.

For children the first is most desirable if there is an associated kidney or heart disease. But for the ordinary uncomplicated case, nothing equals a diet rich in nutrition (as milk, eggs, cereals, cheese) with scraped meat and fruits occasionally added and with the intake of fluids limited to the degree of not causing discomfort. No treatment brings such excellent results as a well balanced, concentrated diet pushed to the child’s digestive capacity but never beyond it.

Lobar Pneumonia and Bronchopneumonia.—Lobar pneumonia and bronchopneumonia demand the same dietetic care but in the case of the latter, care must be exercised over a much longer period. Because of its self-limitation, we can take chances in lobar pneumonia that we would not dare to take in the diet of bronchopneumonia.

Whatever the diet finally adopted, regularity must be insisted upon. The feeding intervals may be two or three hours according to the quantity that is taken. Milk is the most important article of diet and should be made the basis of the dietary. A prolonged milk diet soon becomes distasteful to the child so that it should be varied early and often.

The addition of a carbonated water or lime water is desirable and kumiss or buttermilk may be substituted. Dilution with the different cereal waters or gruels accomplishes the same object. The addition of rice flour to warm milk thickens it enough to make it more palatable. Partial or complete peptonization may also be tried. Vegetable purées make a desirable change. Resort may even be made to the proprietary foods to appeal to the child’s taste.

In a failing appetite we may use beef juice or meat extractives. But we must remember that in giving these we are not giving nourishment (their value as such is practically nil) but a stimulant to the gastric juice. In other words, it is not a food that we are giving but something that prepares the system for the taking of food. Throughout the course of pneumonia, the dietetic problem will be a trying one, because the food that the child takes well one time may be refused the next or vomited if taken.

Tuberculosis.—Tuberculosis in early childhood presents certain peculiarities which are necessary to bear in mind if we are to successfully influence the course of the disease through diet.

1. The more rapid course of the disease is in accordance with the general observation that toward adult life disease tends more and more toward chronicity, while in the very young it is more apt to be acute. With the invasion of the tissues which are not fully developed, the tendency toward rapid dissemination is marked.

2. The rapid dissemination is characteristic of the disease during early childhood in contrast with what takes place in adult life. In adults, pulmonary involvement is primary in the vast majority of instances, while in childhood, pulmonary lesions are usually secondary to a more generalized process. In other words, in childhood, the disease does not tend to spread by continuity but several organs are usually involved at once and wide dissemination is the rule.

3. The course of the disease in the lungs when these organs are affected is modified by the fact that the spread is much more rapid than in adults, the initial lesion may be located anywhere in the chest, the physical signs are inconstant and follow no rules which we have learned from adult tuberculosis. The symptomatology is varied and often misleading.

4. The lymphatic system's susceptibility to invasion is marked in very young children and with involvement of the deeper structures; it may be impossible for a time to recognize the onset.

5. The common involvement of the bony structures is not always easy to explain but the peculiarity is one of the features of the disease as it affects children.

DIETETIC TREATMENT OF TUBERCULOSIS.—The dietetic treatment of tuberculosis in children follows somewhat the same principles that obtain in the adult types but there are the necessary differences that must be adjusted because of the several peculiarities of the disease which have just been pointed out.

The food must be such as is easily digested, which puts no tax upon the digestive capacity and yet fills the nutritional needs which are insistent. Regularity in feeding must be extended over a very long period. The foundation of the diet must be milk, meat, eggs and cereals. With these as the corner-stones upon which to build the diet and with a full appreciation of the fact that no case of tuberculosis in a child will be cured unless the nutritional problem is solved, the physician will be able to adjust the diet to the individual needs in each case. This is what must be done because there are no hard and fast rules that can be set down for the dietetic care of the disease in children. Even under the most favorable conditions the problem is an ever changing one in the same child. It is not alone the problem of sufficient nourishment, but sufficient nour-

ishment properly digested. It is impossible to map out a diet for the tuberculous child, further than the suggestions already made. Frequent readjustments are called for to meet the varying conditions.

A continued appeal against the natural aversion to food which is often shown demands variety in the diet. It is not merely a matter of estimating calories or a nice balancing of what ought to be taken but it is a problem of giving an adequate diet that the patient will take and take willingly. A mixed diet is more readily digested and assimilated. As the appetite is strongly influenced at times by the sight and smell of food, this may be taken advantage of, but not as a routine. The influence of the emotions upon digestion and the desire for food should be remembered and occasionally it may be wise to break in upon the sickroom regularity by withholding food for a time after the emotions have been aroused. Food taken at or near periods of special stress is apt to excite digestive disturbances and therefore should not be given near the time of the physician's visits, the administration of any treatment that is disquieting, or the arousing of the emotions which are incidental to all sickroom régime. Symptoms of gastro-enteric disturbance should be carefully watched for and immediately corrected.

Vomitus consisting of a watery fluid either with or without the presence of curds, or vomitus frothy from fermentation or with an unpleasant or sour odor indicates that there should be a reduction in the amount of food taken to rest the disturbed organs. This is in addition to whatever other means are instituted either medically or mechanically.

It does not always follow, however, that the reduction of the amount of food taken will stop the vomiting. In fact, the reverse is often true. The administration of a much more concentrated food in much smaller quantities but at lessened intervals will result in almost immediate cessation of the vomiting. This is especially true when milk is being given diluted. The addition of citrate of soda (in the proportion of one or two grains to the ounce of milk) makes it much more acceptable to the stomach.

If the stool becomes more watery in consistency, changing in color, frothy in character or offensive in odor, it indicates that some intestinal disturbance is impending. Added to the reduction in the amount of food taken or change of its kind, there must be adequate removal of the offending material from the intestine. In those cases in which exhaustion is not serious and the nutrition has been maintained to a reasonable standard, the mere withholding of all food for from four to eight hours is commonly productive of prolonged relief without any other change being necessary.

The use of nutrient enemata is too distressing to most children to be of value even in tiding over a digestive crisis. Rest is more efficient and does not disturb the confidence of the child; a valued asset to any physician in the management of the tuberculous child.

The prophylaxis of tuberculosis in children in so far as the diet is concerned is not adequate until the child's nutrition is maintained at its full efficiency and the things which are accessory to its maintenance, such as properly regulated play and exercise, fresh air, sleep, etc., are fully regulated and kept under competent and intelligent control. The further fact that lymph-node invasion is so common during childhood, should lead the physician to institute the adequate dietetic precautions along with the other measures in all such cases, so that a disease that is curable may be eradicated before the advent of intercurrent disease renders the case practically hopeless.

Measles, pertussis, influenza and bronchopneumonia in the order named are the great dangers and the child should be especially guarded against them. So great is the influence of the two first named (measles and pertussis) in exciting a latent tuberculosis or changing a lymph-node tuberculosis into a widely disseminated type of the disease, that I warn the parents of every child who has recently contracted measles or pertussis that it is necessary to make a complete physical examination of such child every month for three months after measles and six after pertussis. In this way, it is often possible to detect beginning tuberculous infection. While it might be well to do so, I have not insisted upon such examinations following influenza and bronchopneumonia because the tuberculous infection is usually so immediate that the disease is evident at once. All lymph-node disease must, therefore, receive the most thorough dietetic management in conjunction with any other measures which may be instituted.

Diseases of the Heart.—Diseases of the heart in childhood require a diet that is carefully regulated both as regards order and frequency of the meals as well as the kind of food taken. It is not possible to make the more or less common distinction as is done in adult life between the cases showing good compensation and those in which it is greatly impaired or lost. It is true of children that they compensate well; often too well, so that they do not receive the adequate care until the symptomatology of decompensation is urgent and insistent. In the beginning with compensation good, there need be no marked changes in the normal diet of the child.

It is necessary here to consult individual tendencies and in planning

the dietary to have some clear idea of what the normal for that particular child is. Unless this is done, it is possible that we may overfeed or under-nourish.

There is one danger that I must emphasize in the dieting of heart diseases during childhood. The heart is often enfeebled because a dietary régime is instituted which has as its sole object the lessening of the work of the kidneys. The anxiety to accomplish this, or to reduce an imaginary strain upon the digestive apparatus should not be allowed to interfere with proper nutrition. Many of the cardiac cases which I see are mal-nourished. The meals may be simple but they should be well cooked. By well cooked I mean properly prepared so that no extra tax may be placed upon the digestive system. The size of each meal should be approximately the same and if the habit has been (as is common) to give one meal a day that is considered the principal meal, this should be corrected and all meals placed upon a par as regards size, tastefulness and nutritive value.

Before decompensation, a well-balanced diet without too many restrictions, and a normal amount of fluids is the best. As compensation becomes involved the intervals between feedings may be shortened and the meals made lighter and reduced in quantity. With an impaired compensation, digestive disturbances are common and many and there may be acquired a distaste for food which will prove troublesome. With decompensation arises the question of whether to give a large or a small amount of fluids. If too small, elimination is interfered with and as this is an important factor in cardiac disease, it must be avoided. If a surfeit of fluids is given, it places much more work upon the already overtaxed heart musculature. Definite amounts of fluids should be prescribed and they must be given at stated intervals; small amounts taken frequently and slowly. In no other way can we watch the effect and control the result. The quantity of fluid taken with a meal should be greatly restricted. Vichy is of particular value if it is given a short time before the meals and is excreted promptly.

The average diet for a child who is up and about but restricted in the usual activities would consist of milk, eggs, meat and cereal as the basis of the diet, with the more easily digested vegetables, as spinach, peas, asparagus, string beans, carrots, potatoes, and cooked fruit. With the onset of decompensation, milk becomes more and more the foundation of the diet with the other articles restricted gradually. As all dietetic adjustments are combined with physical and mental rest as essentials in the management of cardiac disease in children, it is possible for the child

to get along on a much lessened quantity of food than when normally active and about.

Purpura.—Purpura cannot be considered as a disease but rather as a symptom. The varied divisions that are made are unnecessarily confusing and may be disregarded. The diet is really influenced by the disease present which brings about the hemorrhages. This would create an individual problem for each case. As a general principle the diet should be rather bland and given cold. Milk is a suitable food and perhaps for general use is the least harmful no matter what the underlying condition. The use of an anti-scorbutic diet is not based upon any good reason, so that it may be disregarded.

Hemophilia.—Hemophilia presents an entirely different problem than purpura because in the case of hemophilia our only possible dietetic result can be the avoidance of injury to the alimentary tract. Diet does not influence this condition except in so far as any well-balanced diet meeting all nutritional needs of the individual, will strengthen the blood vessels and improve the general muscular tone and in that way lessens the chance of serious hemorrhage. The coarser foods and vegetables may wisely be restricted or such foods as are apt to leave a hard dry mass for the bowel to take care of.

Green vegetables, raw milk, cream, cereals (thoroughly cooked) the fruit juices or cooked fruits, fish and well masticated or scraped meat and raw or lightly cooked eggs constitute the best diet. Plain desserts and puddings may be allowed but not pastry.

Nephritis.—Nephritis in children is not prevented by diet. For example, take post-scarletinal nephritis; it is a far too common impression that diet is responsible for the occurrence of the kidney complication in this disease. While clinical experience shows that there is considerable wisdom in the usual restriction of the diet to milk during the very acute stage, it is not as a preventive measure but because such a diet places us in a better position to meet and combat the complication if it arises. The object of all dietary measures in nephritis in children is to limit the work that is placed upon the kidneys and to add no gastro-intestinal toxemias which complicate the situation. Therefore, while toxins may be removed from the alimentary tract it is very important to see that nothing goes into the intestine that may cause toxemias of even slight degree. If there is no complicating gastro-intestinal toxemia and our object is simply to protect the kidneys, the diet will consist principally of milk and cereals.

When the secretion from the kidney has been materially disturbed, the dietetic indications are to withhold all food and give fluids rather

freely but not in excess, while the bowel and skin are brought into action to relieve the strain upon the kidneys. After free evacuation of the bowel has been accomplished, milk, the milk foods and cereals may be rapidly added and made the chief articles of diet for several days at least. In the early stages of an acute nephritis, the milk must be given in small amounts (three to four ounces) and at rather long intervals (four to six hours). With an increase in the quantity taken, which will come in a very short time (few days or a week), the rather long intervals should not be shortened. As the milk diet soon becomes distasteful, it must be varied and the addition of Vichy, cereal water, cocoa, vanilla to the milk or the substitution of buttermilk for plain milk, or one of the proprietary milk foods is desirable. While milk remains the foundation of the diet for a long time, bread, cereals, the fruit juices, fresh vegetables and eggs may be added to give variety. Unless the nutrition is considerably interfered with, meat and cooked egg may be left out of the dietary until the urine is free from albumin.

But in those instances (and they are common enough in childhood) in which nutritional faults show their effect, the diet of nephritis may be rather liberal, if there is an entire avoidance of gastro-intestinal disturbance. It is often surprising how well these nephritic children do upon a carefully selected, well regulated diet and how badly they respond to the ordinary restrictions which we may be justified in placing upon the average case.

Chronic Nephritis.—In chronic nephritis the dietetic problem is somewhat different. While the same general principles obtain and the basis of the diet is the same, there must be a very much more liberal and general diet given. Cooked egg, mutton, lamb, chicken and bacon may be added with advantage. Vegetables may be given freely, but onions, radishes, cauliflower, asparagus and tomatoes should be avoided. These cases do not stand a much restricted diet very long. With the avoidance of physical fatigue the dietary demands are not so insistent. Therefore, rest is an essential part of the dietetic management of all types of nephritis in children, as is also adequate and sustained elimination.

In cases complicated with edema, it is desirable in selected instances, to try the salt free diet. To accomplish this:

1. No salt is allowed in the cooking nor is any allowed at any meal.
2. Meat broths which require salt are absolutely forbidden; in their place the child may have vegetable broths with or without milk or vegetable purées.
3. Milk must be restricted in quantity to one pint daily.

4. All preserved meats, salt-water fish, cheese and butter are forbidden; also ordinary bread, crackers, cakes, etc.

Outside of the above restrictions the diet may be very liberal and largely suited to the child's taste. As the child usually becomes quickly accustomed to the restrictions as regards salt and the dietary is more varied and liberal than the average diet in nephritis, it is more acceptable to most children and may even be used in appropriate cases without edema.

During the whole course of the disease there must be a control of the amount of fluid taken. The average child has usually acquired a certain habit in regard to water drinking and in nearly every instance this requires adjustment when nephritis supervenes. The tendency, however, in nephritis is to overload the system with fluids in the false hope that they will flush the system. A comparatively small amount will do this but an excess will not.

Pyelitis.—Pyelitis requires no special attention to the diet except the avoidance of highly seasoned foods. At first, milk and the milk foods, gruels, cereals and bread-stuffs may constitute the diet but care must be taken that the child receives a sufficient amount of nourishment.

Lithemia.—Lithemia in children is usually observed in those who have gouty parents. It manifests itself in more or less periodic attacks of headache, nausea, vomiting and neuralgic pain. These children are subject to varied eruptions and commonly there is no time at which the skin is entirely free from blemish.

The treatment of the condition is wholly dietetic. In the breast-fed or the artificially-fed infant the milk must be modified when we discover the offending element which may be the sugar, the protein or the fat, each infant exhibiting individuality. A carbonated water in which most of the gas has been allowed to escape is best as a diluent for the milk.

The diet for older children may be liberal, with the following restrictions. Avoid egg albumin, shell fish, salmon, mackerel, sardines, veal, pork, ham, smoked or dried meats and all highly seasoned food. Pastry, cake, sweets, jams, jellies, and candy are prohibited. All uncooked fruits and all kinds of berries, dried fruit, nuts; any but fresh vegetables and potatoes are to be avoided. Carbonated waters may be used freely. Sugar should be cut to a minimum and it may be advisable to use saccharin in its place. In any event, the diet must be regulated permanently and the habits in regard to diet formed early with the idea of the constant restriction of the prohibited articles in view.

Rheumatism.—Rheumatism in children is varied. I presume that

it is impossible for one to gain an adequate knowledge of its complexity, its multiplicity of manifestations and its various results outside of an institution dealing with children in large numbers. Whether considering its diagnosis, prognosis, management or dietetic care, we must leave behind us all preconceived ideas and deductions which we may have acquired through a study of adult cases. A rheumatic arthritis *per se* has little to do with the cardiac changes which occur in the child. These little ones are injured while suffering from a faulty metabolism and may acquire serious damage to the heart without ever having had arthritis. It has not been proven just what relation diet has to the manifestations of rheumatism.

During an acute attack the diet should be adjusted along the same lines as in all acute infectious diseases. The diet must be such as is easily digested, given in smaller quantities and varied as much as the case will admit. At first this may be entirely fluid and especially diluted milk. But as the demands of the whole economy are very great in spite of an enfeebled digestion the nutrition must be adequate. After the first twenty-four or forty-eight hours of a diet of milk diluted with a cereal water, plain water or a carbonated water, cereals and the fruit juices may be added. Animal broths are not contra-indicated in the diet of acute rheumatism, but I do not believe in their use because they are so devoid of nutritive value and are apt to be given to the exclusion or reduction of milk.

With the subsidence of the acute symptoms the diet can be rapidly and safely enlarged so as to include chicken, fish, bread-stuffs, cooked fruits and small portions of meat. With each change in the diet there should be a close watch of the temperature and any elevation should result in a forty-eight hour reduction in the diet. It is not that certain articles of diet directly affect the disease, but the giving of extra food sometimes places a strain upon the child's metabolism which it is not quite ready to stand. This is an indication for immediate reduction. Not uncommonly in rheumatism the anxiety to influence the disease through diet results in a state of acute malnutrition.

During the acute stage, a good diet for the average child would consist of:

Water; plain, carbonated or flavored with fruit juice.

Cereal waters or gruels.

Albumin water.

Milk; raw, peptonized, or prepared in other ways to make it palatable.

Meat extractives (used as appetizers only).

As the acute manifestations subside:

Cereals.

Puddings (plain and with little sugar).

Rice, sago, tapioca, cornstarch.

Bread, crackers, zwieback, toast (dry or milk).

Baked potato (mashed).

As the solids are added the fluids may be reduced, and in fact, must be. As convalescence progresses the diet must be as liberal as is consistent with the usually enforced physical rest.

Chorea.—Chorea presents practically the same dietetic problem as rheumatism—the giving of a sufficient quantity of food to maintain the nutritional balance without interfering with metabolism. But in chorea we are not hedged in by acute symptoms. Diet is a very important factor in the recovery of the choreic child and because of the difficulty of swallowing which is sometimes present there is an added problem of getting the child to take enough nourishment. As in rheumatism we must get away from the preconceived notions that are so common that meat and its extracts and fruit juices are harmful. They may be used rather freely as part of the dietary of chorea. Eggs, which are so freely given, I am not so sure about. Certain it is that many children immediately show a gain in their comfort and in their digestive capacity as soon as eggs are eliminated from the diet.

The choreic child must be well nourished and must have brought to him a variety of foods. This is an important factor in the ultimate recovery and shortens the period of active symptoms.

It is necessary to remember that the strong tendency in chorea, as in rheumatism, is to recurrence, therefore the sugars should be restricted at all times to a minimum. Jellies, jams, candies and all sweets should be markedly reduced if used at all and the child encouraged to partake of a plain, varied, but wholesome diet.

Eczema.—Eczema cannot be cured except by dieting. The use of ointments and pastes, masks and protectors, aluminum mitts and other measures of restraint are all necessary at some time but they are only local protective measures and are not in themselves curative. If the infant is breast-fed, it is necessary to modify the feeding by giving either water, a cereal water or a mixture of milk and water with the protein relatively high, before the breast feeding. This will dilute the breast milk and reduce the whole quantity taken. In many instances this will be sufficient.

The examination of the breast milk is of doubtful value because it is

so inconstant. As a matter of fact we are not dealing with the question as to whether or not the infant is receiving a perfect milk (according to the laboratory) but with what that milk (perfect or not perfect) is doing to that particular baby. In nearly every instance, the fat is too high in eczema. If protein indigestion is indicated (as by colic, curds, eructations) the intervals between feedings should be lengthened and the amount reduced by the giving of water immediately before the breast feeding. It may be necessary to substitute one or two feedings of a cereal water daily.

In the artificially fed baby the problem is comparatively easy of solution because we are dealing with a more constant food and changes may be made quickly.

As a matter of fact, many babies are overfed on milk; milk is given to the exclusion of all other food for too long a period. The digestive apparatus is overtaxed to take care of it and may manifest this as an eczema. In any event, it is my custom to watch the weight and in the beginning, reduce the child's diet to the point that his well-being is not interfered with, but his weight remains stationary. This means that there is a considerable reduction in the amounts of food taken. As the eczema begins to improve, the diet can be enlarged. If the infant is old enough (six months or more) it is possible to give some accessory feeding and cut down on the milk. The accessories may include chicken, beef or lamb broth (fortified with barley or rice) to replace one or more of the milk feedings, cereal diluents of the milk, a daily feeding of cream of wheat or wheatena and also one of junket or custard.

The diet in older children requires the same careful supervision as in infants. Care will have to be taken to discover and eliminate all articles of diet that are known to cause attacks of urticaria or erythema. This requires the study of the individual, for what will harm one child will help another. All gastro-intestinal disturbances must be avoided at the same time that every effort is made to make the nutrition efficient. It will be found to be true with older children as with infants that the great fault has been overeating; amount rather than kind or variety. In those cases that seem to resist all dietetic measures, a diet restricted to rice gruel for twenty-four or forty-eight hours and then the cautious, slow addition of skimmed milk to the gruel, often starts them toward recovery.

When the dietetic treatment is started the parents should be warned that as increase of weight is only one index of the nutrition, the failure to gain should not be looked upon with any alarm and that even a temporary loss in weight may be very desirable,

Urticaria.—Urticaria has as its chief etiological factor in children an exaggerated excitability of the vasomotor nervous system which creates an individual susceptibility to this disease. While it is commonly associated with gastro-intestinal disturbances we must not forget its neurotic element. It is probably this latter element that accounts for the variations which the disease exhibits in that an article of diet which will precipitate an attack at one time will not at another. It requires a close observation of the individual case to determine just what articles of diet will cause it. Until the offending material is discovered it is advisable as a routine to eliminate all shell-fish, fish, uncooked fruits, fruit juices, pastry, sweets and cereals from the diet.

After this is done, the cereals may be added one at a time and the effect noted. If they cause no disturbance, the other prohibited articles may be gradually worked into the diet. But even with this precaution, which will result in discovering the offending article in a large majority of the cases, it may be found that some other substance acts as the irritant. Many of the more obstinate cases yield in time to either a fat-free or a sugar-free diet.

During the acute stage, the diet should be restricted largely to milk diluted with lime water or Vichy. For twenty-four hours, few if any solids should be taken. Adequate bowel elimination is an important adjunct to the dietetic management and so important that it cannot be disregarded.

Chronic Secondary Anemias.—Chronic secondary anemias in children are very common and their dietetic management does not differ materially from that of chlorosis, which will be immediately considered. Milk, eggs, meats, green vegetables and fresh fruits, while constituting the basis of the diet, should not preclude a wide variety in the dietary, which is one of the essentials of successful treatment.

Chlorosis.—Chlorosis does not exhibit any marked changes in either the fat or the muscles. Under the proper dietetic management, there is no radical change, the thin patient usually remaining thin or gaining but little weight and the fat patient losing little or nothing. In general the quantity and variety of the food may be the same as in health, but the meals should be smaller and at lessened intervals.

The best interval is three hours and absolutely no food should be allowed between meals. Usually these patients crave food more between meals than at the time set for them. The appetite being so changeable, the small, frequent meals result in an increased intake of food. Fresh fruits and vegetables should be taken freely but berries are prohibited.

Milk need not be enforced upon the patient. If possible the day should be started with a good, generous breakfast. Meat is one of the best articles of diet to make the foundation of this meal. At the second meal, eggs may be the chief article. If the digestive capacity is reasonably good, a small portion of meat may be taken with the third meal. The succeeding meals should be varied but should consist of articles which are considered as lighter. Broths should not be given unless the patient complains of hunger after a sufficient meal has been taken.

The tastes and wishes of most of these chlorotics may be consulted with the suggestion that they co-operate as closely as possible to the suggestions already made. The dietetic management, extending as it will over a very long period, requires tactful enthusiasm to be successful.

Leukemia.—Leukemia requires a general mixed and varied diet. In this the protein should be pushed as much as possible. Meats, milk and milk foods and eggs may form the basis of the diet, with cereals, bread, crackers and farinaceous foods in moderation, so as to add variety but not to interfere with the ingestion of the more important elements for this disease.

Vegetables are given with the same reservations as are the cereals, having no special value but adding to the variety of the diet. Sugars, starches and fats are not essential except in very small quantities. As they place an additional tax upon the digestion in this disease they may be reduced to a minimum.

It is a desirable plan to arrange the meals so that little fluid is taken with the meal and no milk. Between the meals and at bedtime milk is given. Usually it is a simple matter to get the patient to take six to eight ounces of milk (cold) at mid-morning and mid-afternoon and again at bedtime. The milk taken at bedtime may be hot and flavored with a liberal pinch of salt.

Until the improvement is steady, physical rest should be insisted upon for at least one-half hour after meals. This is best taken in a slightly darkened room. After improvement has begun, all of the time possible should be spent in the open and a considerable part of that time in the sun.

Rachitis.—Rachitis is a disease of infancy rather than of later childhood. Its occurrence after the second year is so unusual as to be considered a rarity. For this reason it is not considered in this chapter. Congenital syphilis, pyloric stenosis, infantile scurvy, are all considered in other sections of this work, to which the reader is referred.

CHAPTER XXV

DIET DURING CONVALESCENCE

J. ALLISON HODGES, M.D., F.A.C.P.

I commend, rather, some diet for certain seasons than frequent use of physic, except it be grown into a custom; for those diets alter the body more and trouble it less. (Bacon)

General Management of Convalescence; General Dietetic Principles; Daily Dietaries; Farinaceous Foods; Eggs; Jellies; Soups; Fish; Meats.

Unfortunately in the past, students of medicine and practitioners in general have not been sufficiently grounded in trophology, trophodynamics and trophotherapy; on the other hand, they have been over-engrossed in pathology, etiology, differential diagnosis, prognosis and specific treatment, if there be such a thing, until their entire attention has been held by the caption of the diseased entity rather than the case, under the caption, of "the patient who has the disease." Is it any wonder, therefore, that the patient himself and his disturbed physiology, or disturbed metabolic functions, are forgotten to his detriment? Just what functions may be disturbed depends, in a measure, on the disease, the lesion, its location, the organs affected, and the leading symptoms. Disturbances will occur, and the physician should direct his attention to their correction by outlining a suitable dietary which, as an adjuvant to the treatment, is of paramount importance.

General Management of Convalescence.—The convalescent patient should not be allowed to suffer pain lest cardiac depression and exhaustion occur. High blood pressure must be assuaged, and circulatory failure must be rigidly guarded against and palliated when present. Almost all acute affections will gradually abate and the patient recover if the physician can sustain the heart and at the same time sustain his patient with a properly well-balanced aliment. This is the "heart age." The heart fails, and the patient passes into the great beyond, sometimes before the physi-

cian has got well into the fight—alas, before the turning point of convalescence is reached. We have passed the bleeding, purging, vomiting, starving age, through the aconite and alcohol ages, to the “feeding age.”

For the scientific application of the principles of trophotherapy to nutrition in disease, we must first recognize that life's processes must go on in illness as they do in health; nutrition must be maintained, excretion must occur, and wear and tear must be replaced by proper aliment and by sleep. The organs concerned in these life processes must be coaxed into the greatest efficiency possible with the handicap left by recent illness.

Here diet, suitable diet, is of the greatest necessity; it must be modified by the gravity and character of the illness, and the condition of the organs of digestion and assimilation, as well as of the organs of excretion and secretion. The alimentation and beverages must be painstakingly considered, and most carefully regulated from day to day to meet the condition or progress in convalescence, or perhaps restricted on account of some lesion which may be found to be permanent.

Physicians should not be over-anxious for a too rapid convalescence. A systolic blood pressure below 105 mm. in an adult should prohibit his sitting up and certainly his attempting to walk. Practitioners of experience have often observed tedious heart weakness from strain occurring after operations and after severe illness, because convalescence was being *rushed* by allowing patients to get up too soon. The appendix patient up and out in six days is a cardiac and abdominal risk that should not be advocated, but deprecated. In addition to proper alimentation, all physical means of massage, physical exercise, fresh air, change of scene and climate, or location at least, should be considered in hastening convalescence and in making the recovery complete.

A convalescent patient should never be permitted to get out of bed until the strength is considered regained. It is far better that restriction be imposed a little too long than that any risk be incurred which might result in relapse. The point of greatest consequence is the proper regulation of the dietary. In our experience, by far the greatest number of relapses has taken place from indiscretions in diet. It cannot be too strongly impressed on the convalescent that it is quite as necessary to guard against the quantity as the quality of food, particularly when there is gastric irritation. “The stomach may be able to digest and the organs to assimilate a limited amount of food with impunity, but the indulgence of an extra ounce or two may induce oppression and upset the whole metabolic process. The stomach in convalescence partakes of the external mus-

cular debility, and the convalescent may as well expect to be able to carry a heavy load on his shoulders as to digest an undue quantity of food, even of a suitable kind."

When the crisis is over, prostration is usually very marked; therefore, great caution should be exercised in the administration of food, and in the allowance of stimulants. If there is any question as to whether stimulants are indicated or not, it is best to restrict all alcoholic stimulation. After the critical period has passed, the sordes shortly disappear from the teeth and lips, the brown fur clears off the surface of the tongue, and with these changes come some return of the appetite and a relish for food. The debilitated condition of the organism as a whole, and in its component parts, must be borne in mind. In all convalescents from serious illness the stomach is more or less involved, and is functionally impaired to the extent that all sick and weak individuals are for the time being "dyspeptics," and must be fed accordingly.

A point of importance to be considered in the feeding of early convalescence is not to raise the patient up abruptly in order to be fed. The long-continued pyrexia in a fever patient may have brought about extensive changes in the musculature of the heart, a great many of the muscular fibers having been reduced to a mass of *débris* in the histolytic process which has gone on, so that the heart-wall is weak. To raise the patient suddenly, under these conditions, is to throw the weight of the blood column in the head, neck and shoulders abruptly upon the heart; the left ventricle gives way and comes to a standstill in diastole, flaccid and distended with blood. Even after a patient has recovered sufficiently to be up and around the room, this danger from heart failure is not fully past; and following the high temperature of relapsing fever, or typhoid fever, it is not unusual for the convalescent to drop suddenly to rise no more—the weakened heart muscle giving way to the strain put upon it.

A very common cause of interruption to the progress of convalescence is the allowance of an excess of food. An overload or surfeit is apt to occur from the appetite being too keen, and the quantity ingested at once too much for the stomach. There is discomfort with a marked rise in temperature, sometimes vomiting, and possibly some purging, an effort on the part of nature to cleanse the system. In patients with a good constitution these intercurrent derangements produce little or no ill effect, but with delicate individuals they are fraught with a certain risk to life, and too often exert a hindering effect upon the progress of the case.

It must be borne in mind that there are convalescents and convalescents. A robust, hardy youth, after an attack of enteric fever, when his appetite

returns, will ravenously eat and digest almost any kind of food, while a delicate girl slowly recovering from an attack of scarlatina, with kidney complications, must be fed with the greatest care and her food cautiously supervised. The kidneys are a great factor in the elimination of nitrogenous waste, and after scarlatina they are not always equal to the great demands put upon them. In arranging a dietary, this functional debility must not be overlooked nor even underestimated. Small quantities of animal food alone are safe here.

The dietetic treatment of patients in whom ultimate recovery is not expected, and whose spirit has been broken by prolonged and wasting illness or repeated disappointments, will largely depend on the nature of the ailments and the personality of the attending physician. After a suitable well-balanced dietary has been outlined, tonics and stimulants may be ordered when they will impress the patient, or sustain or improve his mental or physical well being. The moral influence of an energetic, strong-willed and trusted physician is a factor which counts for great good in these cases. When, however, the physician suspects he is losing, or has lost, the confidence of a patient who is convalescing very slowly, he will be wise if he calls a confrère in consultation or brings to his aid some outside agency, be it psychotherapy, electrotherapy, hydrotherapy, mechanotherapy or massage. Such a move will usually react to the advantage of both patient and physician, and should not be too long postponed.

Fresh air and sunlight are of great value as soon as the patient can be "built up" sufficiently to take advantage of out-of-door life. It is obvious that care must be exercised not to expose the patient too early to a possible chilling of the skin in the out-of-doors atmosphere, but in general, the respiration and other vital functions are stimulated by a convalescence spent as far as practicable in the open air.

The question of allowing visitors during convalescence must be decided by the attending physician. Ordinarily, friends of the patient need only to be told that it is to the patient's advantage for their visits to be short, or for them to stay away entirely for a certain number of days. In some communities, however, there are the "chronic invalid callers," who annoy both the patient and physician by their meddlesomeness. Such individuals should be rigidly excluded from the convalescent's sick chamber.

General Dietetic Principles.—The digestive functions of convalescents vary widely. The healthy young adult recovering from an acute febrile condition, in whom the digestive organs are only slightly weakened, makes a rapid convalescence, and is soon able to ingest and digest all kinds of foods. In patients of this type there is no reason to try to tempt the

appetite; the food should be prepared in the normal way, but the diet of the patient should be supervised in order that he may not overeat. In the case of the invalid, on the other hand, weakened by prolonged illness, or of a child recovering from scarlet fever, perhaps complicated by nephritis, it would be a grievous dietetic error not to limit the quantity of food allowed, and to fail to give very strict and explicit directions as to the quality of the food. Similarly, after typhoid or other debilitating fevers, when convalescence is established, a mass of undigested food, such as potatoes or a piece of unmasticated meat, may cause a relapse by setting up an irritation in some recently ulcerated Peyer's patch. The invalid reduced by abstinence or fever has great need for wholesome, sustaining food, which must be given with prudence. Convalescents often suffer from a dyspeptic ailment, or from a stomachic erethism, which prevents them from assimilating food properly and consequently being well nourished thereby; the intestinal mucous membrane may be more or less irritable, and the nerve centers, owing to the extreme debility of the patient, "only receive with an extreme morbid overexcitability the impression of a fresh regimen."

Invalids recovering from a prolonged and debilitating fever are emaciated from the loss of fat, and to a less degree they are deficient in albuminoid principles and mineral matter. The prime object, in such a case, is to restore all the tissues in the shortest possible time. The fats can be easily restored by proper alimentation. At first, in all cases, the liquid diet (fever diet) should be continued, milk and beef tea being gradually reduced, and thickened beef teas and soups, egg drinks, and various jellies allowed. This dietary can be increased in a few days to include the juice of fruits, milk foods and diluted cream, with the addition of the yolk of eggs, milk, and flour or oatmeal cereals; also honey, sweetened jams, very ripe fruits, particularly grapes, etc., which will introduce into the system sufficient carbohydrates and fats to renew the losses of fat occasioned by febrile disorders.

So far as the proteins are concerned, they must be allowed with much caution for fear of indigestion, as they are not always easily assimilated in those instances in which the digestive function has been impaired by prolonged febrile conditions. Furthermore, fairly small quantities are sufficient for convalescents, 50 grams daily being the maximum at the beginning. The convalescent should have small meals at frequent intervals—every four hours, and occasionally as often as every two hours—in order to supply the requisite aliment without overloading the stomach. Salad, cabbage, mushrooms, acid, tough or oily fruits, spiced condiments, pickles,

"high game," pork, too fat fish, etc., should be rigidly forbidden. Milk is the food *par excellence* for the convalescent. It may be given raw or cooked, plain or mixed with Vichy, lime water, etc. Fresh buttermilk is also an admirable food. As the strength of the patient increases, a more liberal dietary is in order, fish, sweetbreads, chicken, game, squab, being gradually added. A little later, minced beef, eye of a tenderloin chop, or a small slice of tender beefsteak, or a small portion from the under cut of a medium cooked sirloin of beef may be given. The patient should be cautioned to eat slowly and masticate well. Fish is rich in albuminoids and phosphorus and is quite easily digested. A few drops of lemon juice squeezed over the fish generally make it more agreeable to the palate. The flesh of boiled fowl is also palatable and easily digested. Grated raw meat is easily digested, especially when swallowed without mastication.

The mineral salts as foods are absolutely indispensable to the convalescent; above all, the salts of potash, sodium, lime and magnesia, in the order given. A diet rich in these organic mineral salts is necessary, especially for those who, for a long time, have been upon a low diet, and for children and youths, as well as for every invalid who has suffered from hemorrhage arising from any cause. Milk is one of the most efficacious foods to hasten remineralization. Meat broth is particularly rich in phosphates of potash and in salts of magnesia, and supplies these salts to the muscular tissues. If powdered casein be added to the broth, it enriches it in phosphorus and lime. Bread, milk and vegetable purées especially supply the means of introducing phosphorus in a most assimilable form. Phosphorus is also contained in cereals and bread, and in vegetables in the form of phytin and oxymethylenophosphoric combination. The salts of this organic phosphoric acid introduced directly into the system seem to give excellent results compared with other phosphoric compounds. Remineralizing drinks are also useful. The best are decoctions of oats, barley, flour or wheat accompanied by a little red Bordeaux wine or Burgundy, which acts as a light ferruginous tonic. The best method of combating the causes of demineralization—hyperchlorhydria, dyspepsia, anemia, etc.—is to provide the organism abundantly with the salts in which it is lacking, which can be done by properly selected aliments or medicaments. Phosphorus in the form of glycerophosphates or lecithins may be given by the stomach or preferably in the digestible forms which occurs in certain foodstuffs—for instance, yolks of eggs, seeds of vegetables, bread, fish, brains, crustacea, etc. Foods rich in phosphorated organic products are more easily digested and more readily assimilable.

Daily Dietaries.—The following seven days' dietary sketched by Watson gives an indication of the variety of foods necessary to supply the convalescent patient with the ternary food elements and the necessary mineral constituents of the diet. In many instances a more rapid return to ordinary diet could be made than outlined below, while in others the change would require to be made more gradually than outlined in this dietary. Following this dietetic scheme are directions for the preparation of farinaceous and other foodstuffs of special value in convalescence:

SEVEN DAYS' DIETARY

FIRST DAY

7 A.M.:

If awake early, a small cup of freshly made tea with cream.

Breakfast, 8.30 A.M.:

Milk and thick barley water, half a slice of toast, cut in fingers.

Forenoon Lunch, 11.30 A.M.

Calf's-foot jelly, about 2 ounces.

Dinner, 1 P.M.:

Thick beef tea; egg and tapioca grout; a few grapes (juice and pulp only).

Afternoon Lunch, 4 P.M.:

Cup of tea, with milk and cream; thin slice of bread and butter.

Supper, 6.30 P.M.:

Cup of Benger's food (or other invalid food).

9 P.M.:

Cup of beef tea.

SECOND DAY

7 A.M.:

A small cup of coffee, with milk.

Breakfast, 8.30 A.M.:

Malted gruel.

Forenoon Lunch, 11.30 A.M.:

Milk and soda, water, with plain biscuits.

Dinner, 1 P.M.:

Beef tea purée with strip of toast; blancmange.

Afternoon Lunch, 4 P.M.:

Cup of tea, with milk and cream; 1 slice bread and butter; 1 sponge finger.

Supper, 6.30 P.M.:

Plain egg flip with biscuits.

9 P.M.:

Cup of chicken soup or chicken jelly.

THIRD DAY

7 A.M.:

A small cup of freshly made tea, with cream and small half-slice toast.

Breakfast, 8.30 A.M.:

Saucerful of oatmeal gruel, with cream and a little piece of Vienna roll (crusty part).

THIRD DAY—*Continued*

Forenoon Lunch, 11.30 A.M.:

A teacupful of beef tea (unthickened), either hot or cold.

Dinner, 1 P.M.:

Steamed whiting; half-slice of bread; Semolina or ground rice pudding.

Afternoon Lunch, 4 P.M.:

Potash and milk, with rice biscuit or sponge cake; a little fruit.

Supper, 6.30 P.M.:

An invalid food, in any form.

9 P.M.:

Some variety of meat tea or infusion.

FOURTH DAY

Breakfast, 8 A.M.:

Saucerful of hominy porridge or barley-meal gruel, etc.; a small cup of tea, toast and a very little butter.

Forenoon Lunch, 11.30 A.M.:

A teacupful of chicken tea, with milk and potash or a little fruit.

Dinner, 1.30 P.M.:

Baked or steamed fish; spinach; apple cream.

Afternoon Lunch, 4 P.M.:

Potash and milk, or a small cup of fresh tea, bread and butter, and sponge cake.

Supper, 6.30 P.M.:

Peptonized cocoa and milk, or custard.

9 P.M.:

Some variety of meat infusion, e.g., veal tea.

FIFTH DAY

Breakfast, 8 A.M.:

A lightly boiled egg; toast or roll with butter; a small cup of tea.

Forenoon Lunch, 11.30 A.M.:

Teacupful of soup, or a little fruit, and a drink of milk and potash.

Dinner, 1.30 P.M.:

Rabbit, chicken (roast), two slices from breast, or pigeon served with bread sauce; a small helping of vegetables, e.g., stewed vegetable marrow or cauliflower, not potatoes; pudding: apples cooked in water, sago, eaten with cream.

Supper, 6.30 P.M.:

Oysters.

9 P.M.:

Some variety of soup.

SIXTH DAY

Breakfast, 8 A.M.:

A piece of boiled or steamed haddock; whiting, or sole; tea, bread or toast and butter.

Forenoon Lunch, 11 A.M.:

Soup, or egg drink.

SIXTH DAY—*Continued**Dinner, 1.30 P.M.:*

Sweetbread or tripe; vegetables, stewed tomato (pulp only); stewed fruit with custard.

Afternoon Lunch, 4 P.M.:

Afternoon tea (avoiding rich cakes and pastry).

Supper, 6 P.M.:

Poached egg on toast or spinach; milk and potash.

9 P.M.:

Cup of soup.

SEVENTH DAY

Breakfast, 8 A.M.:

A few rolls of well-fried, streaky bacon; toast and tea.

Forenoon Lunch, 11.30 A.M.:

Egg flip, or soup, or milk and potash; fruit.

Dinner, 1.30 P.M.:

A small slice of tender roast mutton, or the eye of a tender mutton chop; vegetable; jelly.

Afternoon Lunch, 4.30 P.M.:

Tea (avoiding rich cakes and pastry).

Supper, 6.30 P.M.:

Fish; milk pudding.

9 P.M.:

Cup of soup.

This dietary will furnish about 50 grams of protein, and altogether a fuel energy of from 2,000 to 2,500 calories daily. As previously pointed out, the average individual has from 12 to 36 pounds of available chemically pure fat. The oxidation of 250 grams—8 ounces—would furnish approximately the total number of calories required, and with the 50 grams of protein from the dietary daily, the average patient may theoretically subsist from three to nine weeks on his own tissues.

The following is an outline of a liquid and soft solid diet in use by the Massachusetts General Hospital for typhoid, acute infectious diseases, convalescence from operation, heart decomposition, etc. It has been frequently used by Dr. J. Allison Hodges with satisfaction after liquid diet has been discontinued:

LIQUID AND SOFT SOLID DIET: MASSACHUSETTS GENERAL HOSPITAL

FIRST DAY

Breakfast, 8 A.M.:

Wheat cereal (as wheat germ or shredded wheat), with cream or salt only; milk, 4 ounces.

FIRST DAY—*Continued*

10-11 A.M.:

Crackers and milk, or eggnog.

Dinner, 1 P.M.:

Pea or potato purée; soft or cream toast; soft boiled egg.

3-4 P.M.:

Rice, tapioca or custard.

Supper, 6 P.M.:

Cereal or rice; milk, 4 ounces.

8 P.M.:

Crackers and milk.

SECOND DAY

Breakfast, 8 A.M.:

Indian meal mush or farina; milk.

10-11 A.M.:

Crackers and milk.

Dinner, 1 P.M.:

Minced chicken; mashed potatoes.

3 P.M.:

Chocolate or crackers and milk.

Supper, 6 P.M.:

Cream toast; ice cream or custard.

9 P.M.:

Crackers and milk or Mellin's Food.

THIRD DAY

Breakfast, 8 A.M.:

Cereal; milk.

10-11 A.M.:

Mellin's food or crackers and milk.

Dinner, 1 P.M.:

Soft-boiled eggs; rice; apple sauce.

3-4 P.M.:

Cornstarch or custard.

Supper, 6 P.M.:

Potato purée; toast.

9 P.M.:

Crackers and milk.

Drinks: Grape juice, lemonade, orangeade, albumin water with sugar.

Convalescents that have long subsisted upon an exclusive milk dietary should be allowed solid food with caution. The following schedule ¹ outlines fairly well the precautions to be exercised. Of course, it is not suggested that this schedule be followed to the letter; the patient's condition and environment, and the question of economics are all to be considered.

¹ From, Benedict, with adaptation from Thompson, Practical Dietetics.

First Day:

Chicken broth thickened with rice, for one feeding.

Second Day:

Milk or cream toast, one or two feedings; or broth as before for one feeding, milk or cream toast for another.

Third Day:

Scraped beef sandwich about noon; soft egg or baked custard early in evening. (The beef should be broiled on a hot plate.)

Fourth Day:

Soft parts of three or four oysters; meat broth thickened with beaten egg; cream toast; rice pudding without raisins.

Fifth Day:

Scraped beef sandwich; tender sweetbread; bread and milk.

Sixth Day:

Farina and milk; rice pudding or blancmange with whipped cream; soft-boiled egg and dry toast.

Seventh Day:

Omelet; Bavarian cream; toast or crackers.

Eighth Day:

Tenderloin steak; boiled rice; wine jelly; sponge cake; add toast or crackers to various meals.

Ninth Day:

Tender roast beef; mealy baked potato; orangeade. Add dry bread; toast, various kinds of crackers, toasted or not; and soft cereals, including nearly all breakfast foods except oatmeal and gritty wheat preparations, to this and subsequent rations.

Tenth Day:

Lamb chop, or baked or broiled fish or very small piece of boiled ham; baked, creamed or toasted boiled potato and simple desserts about as on previous days. Substitute chicken breast, squab or tender but unspoiled game or stewed or baked or raw oysters for meat. Aim to secure variety of foods without departing from the general kinds mentioned.

Farinaceous Foods.—Farinaceous foods may be served alone or as extras with meat. The value of the different farinaceous foods is often much influenced by defective cooking. In their preparation prolonged boiling is required in order to soften the cellulose and release the starchy granules. The stomach of a convalescent can do very little with uncooked starchy food. There are many partially cooked cereal foods on the market which do not require prolonged cooking. For directions for preparing cereals and farinaceous foods *see* Volume II, Chapter XVII, page 608. There will be found recipes for the preparation of various farinaceous foods and custards. The addition of eggs to a pudding greatly improves the flavor and appearance, as well as the fuel value or energy, but makes it slightly more difficult to digest. The essentials for a good milk pudding are to have

the starchy food thoroughly and completely cooked and the eggs lightly cooked. It is best to beat up the white of the egg separately, as this introduces air into the pudding and acts as a leavening. For flavoring, the most suitable substances are fresh lemon rind or juice, essence of vanilla, and ground cinnamon.

Eggs.—Fresh eggs, either raw or cooked, may be allowed a convalescent. The method of administering raw eggs is described in Volume II, Chapter XVII, p. 581. When given alone, they may be given as prairie oyster, boiled egg, poached egg, scrambled egg, or baked egg. They can be added to soups as thickenings, as in beef tea, consommé with egg, and consommé with custard. The digestibility of the eggs depends upon the manner in which they are prepared. Hard-boiled eggs are difficult to digest by weak stomachs and may often cause painful sensation, because the coarse albumin, which is not readily dissolved, irritates the sensitive mucous membrane of the stomach. A hard-boiled egg may be finely pulverized and administered without any disturbance.

Omelet soufflé and dried egg are rather difficult of digestion, while soft-boiled eggs and poached eggs, prepared with very little fat, are usually readily digested. Eggs are a very nourishing food for children on account of the lecithin and phosphates they contain.

Jellies.—Jellies provide a pleasant change from the ordinary milky foods, and are much appreciated by invalids. The directions for calf's-foot jelly and plain gelatin jelly will be found in Volume II, Chapter XV. They are most agreeable when taken with whipped cream, which increases their fuel value.

Soups.—Soups form a delightful change after the monotony of beef teas and extracts. In Volume II, Chapter XVII, will be found recipes for making a plenteous variety of both meat and vegetable soups.

Fish.—Raw oysters, whiting, haddock and sole are the most easily digested varieties of the fish group. Directions for serving and preparation will be found in Volume II, Chapter XVII.

Meats.—Meats may be served in the usual manner, as in the form of roast, boiled or stewed. Of the animal foods, poultry (chicken and turkey), game (pheasant and partridge), tripe, sweetbreads and rabbit are the most easily digested. Tripe and sweetbreads form most excellent dishes, and only require to be more thoroughly known to be appreciated. Beef and mutton may be served as minced beef, and meat-juice mince, or beef quenelles, and are very digestible; mutton chops, roast leg of mutton, and grilled rump steak require more exertion of the digestive functions. In Volume II, Chapter XVII, will be found recipes for the prepara-

tion of chicken, game, etc. Tripe and sweetbreads are so highly recommended by Watson as excellent dishes for the convalescent, that we will give his directions for preparing and serving same:

Tripe: The best varieties of tripe are those known as the "blanket" (because it has a folded appearance), and the dark variety known as the "monk's hood"; these are best for invalids on account of their tenderness. The other sorts are known as the "book" and the "honeycomb."

If tripe is properly prepared, it is a most delicately flavored and easily digested article of food, and should be in more constant use than it is at present. It requires, however, *very careful cleaning* and *boiling*. In Scotland, prepared tripe cannot be purchased at the butcher's, so it is necessary to understand the whole process. Tripe sold in England has generally had a preliminary boiling.

First wash and scrub in water several times, and scrape it with a knife, pulling away any pieces of fat from it. Cut it into pieces and put it into a clean saucepan with cold water to cover it, and bring it to the boiling point. This is called blanching, and is repeated until the water in which the tripe is boiled loses all its heavy smell. It may be necessary to do this four or five times. Then rinse the saucepan well, put in the tripe with cold water to cover it, bring it to the boil, and cook slowly for ten to twelve hours. If cooked too quickly the tripe will harden. When sufficiently cooked, it ought to be so tender that it will easily pull to pieces. Pour it out into a basin and cover it with the liquor in which it was cooked. This prevents it becoming hard and dry. It can then be made up in any way desired.

The water in which the tripe is boiled should never be thrown away, as it contains a certain amount of nourishment. It is sometimes served as an invalid jelly.

Sweetbreads: There are two varieties of sweetbread—the "throat" sweetbread (thymus gland) and the "stomach" sweetbread (pancreas). The latter is much more digestible. Veal sweetbreads are very tender, and the only kind suitable for an invalid. This article of food, however, must always be nicely prepared, or it is very unappetizing. The difficulty is to clear off all the connective tissue and fat from between the lobules.

Soak the sweetbread in cold water for one or two hours. Then put it into a saucepan with cold water to cover it. Bring to the boil, and boil for five minutes. Then lift it out and place in a basin of cold water to cool it. This preserves the color of the sweetbread. Then, with great care, remove from it all the fat fibers and skin, pulling them off with the fingers. It is now ready for cooking.

CHAPTER XXVI

SPECIAL METHODS OF FEEDING

Rectal Feeding: Nutritive Value of Enemata; Methods of Assimilation; Indications; Technic; Foods for Rectal Enemata; Nutrient Enemata by the Drop Method; Metabolism of Rectal Feeding.

Duodenal Feeding.

Subcutaneous Feeding: Hypodermoclysis; Subcutaneous Administration of Food.

Gavage.

Inunctions.

Feeding Through Fistulæ.

Saline Irrigations and Infusions.

The science of physiology combined with surgical experimentation has clearly demonstrated that, while all the alimentary organs have a distinct purpose and discharge functions peculiarly their own, yet man can maintain a fair degree of health without mastication and insalivation. He can get along without a stomach, without the large intestine, and even with the bile diverted from the intestinal tract; he may lose ten or fifteen feet of the small intestine without hindrance, but the pancreatic juice must be emptied into the remaining part. Of course it is understood, at the beginning, that no adequate substitute for normal digestion can be devised which does not include the passage of the digested aliment through a portion, at least, of the small intestine.

RECTAL FEEDING

When for any reason patients cannot or will not take food by mouth, other methods of introducing it must be employed. When swallowing is difficult or impossible from growths involving the throat or esophagus, or from stricture of the latter, where there is paralysis of the muscles of deglutition, in cases of ulcer or tumor of the stomach, and in cases of uncontrollable vomiting, rectal alimentation may be resorted to. When for any reason patients are incapable of ingesting the requisite amount of

food for sustaining life, additional food may be given for a short period of time per rectum.

Rectal feeding(1), or the introduction of nutrient enemata per rectum, has constituted a therapeutic resource of artificial alimentation since the earliest days of medical science(2). *Ætius*, *Galen* and other ancient authors mention this method, and writers during the Middle Ages refer to the subject, though with faint praise, due perhaps to their imperfect technic, which did not give very encouraging results. It is only within the recent past that the value of this method of introducing nourishment has been subjected to careful scientific inquiry.

The absorptiv. function of the colon and its power for metabolizing protein have been studied at length by a number of research workers: *Eichhorst*(3), *Leube*(4), *Brandenburg*(5), *Huber*(6), *Ewald*(7), *Plantenga* and others(8). *Hutchison*, summing up their results, says: (a) Peptone is well absorbed; (b) eggs given alone are not well absorbed, but if 15 grains of sodium chlorid are added to each egg they are almost as well utilized as if they had been peptonized; (c) raw beef juice is almost completely absorbed; (d) albuminoids, such as gelatin, are not absorbed. The reports of different investigators with enemata of casein are conflicting. Some observers report that it is absorbed with the greatest difficulty, but *Eichhorst*, and more recently *Ehrstrom*(9), who used a soluble casein preparation, claimed that it is well taken up by the rectal mucous membrane. *Hoppe*(10), experimenting with sanato-gen, found it is absorbed to the extent of 77 per cent. *Bauer* teaches that only one-quarter of the nutriment necessary for the body can be absorbed from the large intestine. He and other early writers advocate from one to two weeks as the time limit during which rectal feeding is practicable. With careful technic, this period of time can be lengthened from four to six weeks, depending on the capacity of the individual for continued absorption, and in a measure upon the amount of energy stored up in the body at the beginning of the rectal feeding.

Von Leube was able, by painstaking care, to keep a patient alive for six months, and *Reigel* reports a case in which he nourished a patient for ten months exclusively on rectal feeding(11).

Gilman Thompson(12) reports the case of a patient which he supported for seven weeks by means of rectal alimentation. *Flint*(13) tells of a patient under his direction that was nourished for fifteen months by rectal feeding alone, and who had been maintained chiefly by this method for the previous five years. These are, of course, extreme cases, but it is safe to say that the average patient may be maintained for from

three to eight weeks by means of artificial feeding exclusively; and this is sufficient time to produce good results in most instances. Friedenwald and Ruhräh(14) state that a patient may be satisfactorily sustained on a nutrient rectal enemata for from four to seven weeks.

Nutritive Value of Enemata.—The nutritive value of nutrient enemata has, according to recent investigations, been somewhat overestimated, and the physician should keep clearly in mind the fact, when employing this method of alimentation, that the patient is receiving, at best, only a portion of the food he requires. While it is acknowledged that patients have subsisted upon nutrient enemata for several weeks, yet it must be admitted that it has been largely at the expense of the body tissues. Boyd(15) points out the fact that the amount of food absorbed depends upon the patient's capacity for absorption more than upon the quantity of food injected. Therefore, it is not always practicable or desirable to give large enemata, the unused portion of which is likely to decompose and cause irritation. Kemp(16) reports a case in his practice in which a physician was ordering injections of large quantities of raw milk which fermented, curdled and underwent putrefaction, giving rise to a toxemia with a temperature going beyond 105.

We have already discussed the absorption of protein by the rectum and colon. As regards carbohydrates, it has been found that sugars are well absorbed, but are apt in concentrated solution to irritate the mucous membrane of the colon. For this reason solutions should not be stronger than 10 to 15 per cent and not more than 300 c.c. should be given at one time, and even then there is a risk of the enema being very soon returned. Strange to say, starch seems to be fairly well absorbed even when given in the raw state; 50 to 100 grams may be given in 300 c.c. of water, and it has not been recorded that starch so administered has produced signs of irritation. This statement is not quite borne out by the recent observations of Reach(17), who administered enemata of 60 grams of sugar or dextrin in 120 to 200 c.c. of water, and of 100 grams of starch in 300 c.c. of water, using the respiratory quotient as the test of absorption. He concludes that some sugar is absorbed, but very little starch. He is inclined to recommend the use of dextrin, for it is as well absorbed as sugar and less irritating to the mucous membrane. O. Grunbaum has found that 30 grams of sugar can be absorbed without the production of glycosuria.

Experience with the administration of fats in nutrient enemata is that they are not well absorbed. The total amount absorbed depends on (a) the quantity and amount administered; (b) the length of time it remains in the colon; (c) the temperature of the enema; and (d) the pres-

ence or absence in it of sodium chlorid. It would be wise not to attempt to give more than 25 grams of fat at one injection, and it should be given at the temperature of the body, and enough salt added to form a normal salt solution. Of course, the bowels should be previously prepared and only one enema given daily.

From the previously recorded experience of investigators it follows that the most suitable ingredients for nutrient enemata are: (a) peptones with albumoses; (b) eggs with the addition of salt; (c) raw beef juice; (d) dilute solutions of grape sugar or dextrin and perhaps unboiled starch. Alcohol, which is perhaps better absorbed by the large intestine than any other substance with the exception of water, may also be added to enemata.

All the various classes of foods may be utilized in rectal feeding, but research workers are not yet in accord as to the best forms nor the precise amounts absorbed, and the subject is still worthy of study. Boyd(18) found that from 240 to 645 calories may be absorbed daily. He advises an enema containing the yolks of two eggs, three grams of pure dextrose, 0.5 grams of common salt and 300 grams of pancreatized milk. This represents about 300 calories, and if given 4 times in the 24 hours, will supply 1,200 calories, of which one would expect about 500 to be absorbed.

It is pretty generally conceded that the colon secretes no digestive ferments, so the function of the large intestine to absorb certain aliments is not easy of explanation. The question, then, may be asked, how is it capable of absorbing such substances as egg white, meat juices and unboiled starch? There is only one plausible explanation, and that is the possibility of the epithelial cells of the mucous membrane of the bowel being capable of modifying them chemically, or by admitting the occurrence of a reverse peristaltic action which carries substances injected into the rectum and colon beyond the ileocecal valve and up into the small intestine. That such a reverse peristalsis exists, Hutchison thinks, is no longer in doubt. It has been proven by the experiments of Grutzner(19), by the observations of Nencki, Macfayden and Sieber on a patient with a fistulae at the lower end of the ileum(20), and "by the incontestible fact of the occasional vomiting of foods administered in the form of nutrient enemata by hysterical patients." It is within the bounds of a possibility that a part, at least, of a nutrient enema may be carried into the small intestine by reverse peristaltic action, where absorption naturally occurs. The ability with which some patients are able to absorb nutrient enemata may be explained by variations in the patency of the ileocecal valve.

Pavlov does not believe that nutrient enemata pass the ileocecal valve where absorption is more complete than in the large intestine, nor does he

believe that nutrient enemata cause a reflex secretion of gastric juice. On the other hand, we do not think there is much doubt but that colonic feedings can be made to pass through the ileocecal valve. By first placing the patient on the left side, gradually introduce the enema, let the patient slowly assume the prone position, elevate the hips, and later gradually turn on the right side. These several positions, aided by the force of gravitation, will help the enema onward through the ileocecal valve into the small intestines much more frequently than we are prepared to admit,

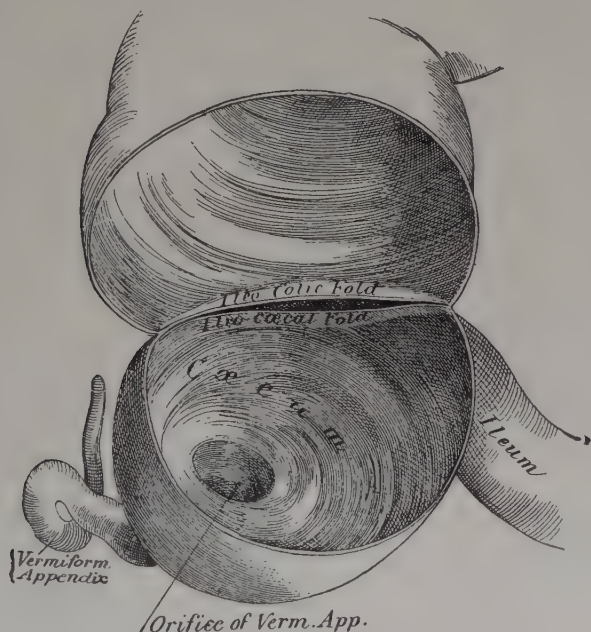


FIG. 5.—PATENCY OF BAUHIN'S VALVE (ILEOCECAL VALVE) AS CONTRACTED BY THE ILEOCECAL FOLDS IN THE CECUM. (Allen's Anatomy.)

and with colonic feeding we can certainly supply to the system all the necessary fluids and inorganic salts, and supply at least a part, and probably all, of the requisite amount of the ternary food elements required to sustain an individual while at rest and in bed.

We believe that sufficient nourishment can be absorbed from rectal alimentation to maintain life and fair nutrition, even for some weeks; and in the great majority of cases it is not necessary to have recourse to this system of feeding for more than eight or ten days at the outset. This much is certain, that rectal alimentation when carried out with caution is of very great value in treatment.

From the above authorities, as well as our own practical experience, there is no question but that patients can be sufficiently nourished by foods administered per rectum.

Methods of Assimilation.—While realizing that the secretions of the rectum and colon possess very little digestive power, yet certain authorities have advanced peculiar theories explaining the method of assimilation per rectum. For instance, Flint(21) says: "When food comes in contact with the rectum, while the stomach is empty, the gastric and intestinal juices descend to the rectum." Baty, quoted by Drucek(22), concludes from experiments on cadavers that the injected nutrient enemata ascend the whole digestive tract instead of remaining in the rectum and colon. He thus accounts for the phenomenon of patients being able to taste substances such as quinin when administered rectally. Brown(23) cites the case of a patient who was able to recognize the taste of potassium iodid or ergot 15 to 30 minutes after the substance was introduced into the rectum. Tuttle in discussing this subject voiced the opinion that the recto-peristaltic action whereby the enema is carried through Bauhin's valve into the small intestine is the exception, and that in practice most of the nutrient probably is absorbed directly from the colon. Voit and Bauer were the first to suggest the addition of sodium chlorid to meat juice, eggs and peptones as an aid to the absorbability of these foods when given in nutrient enemata. They believe that the sodium chlorid stimulates reversed peristalsis to such an extent that many writers, as Grutzner(24) and later Swiecznski, have been able to demonstrate in the stomach the presence of substances that have been administered per rectum.

Cannon(25) by means of the X-Ray has studied the movements of the large intestine for the purpose of determining how nutrient enemata are received and acted upon in the colon and small intestine. He introduced, in large and small amounts, thin fluid and thick mushy masses into the colon of different animals. The enemata consisted of milk, 100 c.c., 1 egg, 10 to 15 grams of bismuth subnitrate, and 2 grams of starch to hold the bismuth in suspension. In order to thicken the enema, the several ingredients were stirred together and boiled to a soft mush. If it was desired to have the enema thin, the several ingredients, with the exception of the egg, were boiled together, and the latter was added after the mass was cooled. The smallest amount injected was 25 c.c. and the largest amount 90 c.c. The animals were given a cleansing clyster, which was followed by the nutrient material. In order to make sure of his observations, Cannon took a radiograph before the enema was introduced, which was followed by a series of radiographs taken at varying intervals

after the injection in order to record the course the food was following.

In recording his observations, Cannon says:

When small amounts of nutrient fluid were introduced, they lay first in the distal colon. In every instance antiperistaltic waves were set going by the injection, and the material was thereby carried to the cecum. When large amounts were injected, they stopped for a moment in the region between the second and last third of the colon, as if a constriction existed there. Then a considerable amount of the fluid passed the point, and the antiperistaltic waves began their action. In any case, the repeated passing of the waves seemed to have the effect of promoting absorption, for in the region where they continued running, the shadows became gradually more dim, and finally the bismuth appeared to be only on the intestinal walls; in other regions—*e.g.*, in the distal colon—the shadows retained their original intensity. Small injections were never forced, even partially, into the small intestine; but with the larger amounts, whether fluid or mushy, the radiographs showed many coils of the small gut filled with the bismuth food.

The pressure required to force the injected material beyond the ileocolic sphincter is probably due largely to antiperistalsis in the colon—a factor unknown to both Grutzner and his opponents. The sphincter, which is thoroughly competent for food coming normally from the small intestine into the large, is, for some unknown reason, incompetent for a substance, even of the consistency of thick cream, introduced in large amount by rectum. When the valve first permits the food to enter the ileum, the fluid pours through and appears suddenly as a winding mass occupying several loops of the intestine. The winding mass is continuous from the valve to the other end; antiperistalsis is therefore not visible in the small intestine under the circumstances of this experiment. The antiperistaltic waves of the colon, however, continue running; the proximal colon is thus almost emptied, and the small intestine more and more filled with food. After a short time the typical segmenting movements can be seen in the loops, busily separating the food into small masses and over and over again dividing and redividing them.

By means of the Röntgen ray, both Grutzner(26) and Hurtz have been able actually to observe reversed peristalsis in the colon, confirming Cannon's findings. Elliott and Barclay-Smith have also observed a reversed peristaltic movement of the proximal colon(27). This antiperistaltic movement of the colon presses upon the confined material, and each contraction forces it away from the distal, towards the proximal end of the colon. At present the evidence is inferential to support the view that antiperistalsis occurs in the human proximal colon; still, observations just recorded seem to confirm the fact that it does occur. In cases of cecal fistula, rectal enemata often traverse the entire length of the colon and escape through the artificial opening. Surgeons have endeavored to stop fecal discharge in such cases by transplanting the ileum into the transverse

colon, and they have observed that the discharge still continues. One case is reported in which the ileum was sewed into the lower end of the descending colon, and even then the discharge through the fistula in the cecum persisted. The colon was finally cut across and closed immediately above the junction in order to stop the backward transportation of fecal material(28). Cannon states that these findings are in harmony with his observations in experimenting with animals in which he has clearly demonstrated antiperistalsis. He also states that only on one occasion has he observed a portion of the contents of an enema to pass backward from the colon as far as the stomach. This experiment was brought about by the injection of 100 c.c. of warm water into the rectum of a cat. Ten minutes later the animal vomited a clear fluid resembling mixed water and mucus. In the fluid he found two worms still alive, commonly found in the small intestine of the cat.

In discussing the value of rectal feeding, Adler of the University of Maryland(29) has shown the futility of the use of peptonized milk in actual metabolism experiments. In order to ascertain the extent of absorption of food administered by this method, the colonic intakes of nitrogen for from four to six days were compared with the output in the urine and the return loss from the rectum. Patients suffering from gastric and duodenal ulcers, but without abnormality of nutrition, were selected as subjects for his experiments. The maximum amount of nitrogen that Adler was able to introduce by rectal alimentation was 3.9 grams, of which 2 grams were returned in the excreta. In no case was there a disappearance of more than 50 per cent of the protein supplied; in some cases the apparent absorption was as low as 30 per cent. The average amount of nitrogen absorbed in Adler's cases was 1.14 grams per day, equivalent to 7.1 grams of protein. When the actual amount of nitrogen lost by these patients is compared with the amount that it is possible for them to absorb by the colonic feeding, one must realize how little is accomplished.

Indications.—Rectal alimentation is indicated in the following conditions:

(a) In temporary obstruction to the alimentary canal, as by foreign bodies, neoplasms, inflammatory swellings of the mouth, pharynx or esophagus resulting from disease, corrosive poisons, etc.

(b) In inability to swallow food, as during coma, delirium or post-diphtheritic paralysis.

(c) In gastric disturbances, such as acute gastritis, ulcer or cancer of the stomach, reflex vomiting of pregnancy, or seasickness.

- (d) In conditions of stricture of the esophagus or stricture of any portion of the intestinal tract above the ileocecal valve.
- (e) In feeble digestion when emaciation is increasing.
- (f) In insane patients who refuse food by the mouth.

Technic.—In rectal alimentation the minutest details are of momentous importance, and the enemata should always be administered by the physician himself unless he has a trustworthy trained nurse in whom he can place the utmost confidence, inasmuch as the patient's life depends on his ability to endure the continuation of alimentation by this method. Should the rectum become irritated, which often occurs, it means suspension, at least temporarily, of this mode of feeding, and yet only rarely can the foods be withheld long enough to permit the signs of local irritation to subside. Occasionally a highly cultivated female patient will object to rectal feeding, and then, naturally, the physician must use tact and moral suasion.

Before taking up in detail the technic of administering enemata, it is necessary to emphasize the following facts: (a) the rectum must be freed from feces and mucus before administering the nutrient enema; (b) any irritability of the rectum must be relieved as quickly as possible; (c) the quantity and quality of the nutrients introduced must be regulated carefully to avoid peristalsis and to facilitate *complete absorption of one portion before another is administered*.

The success of rectal feeding depends largely upon proper technic. The utmost care is necessary in the manipulations, because irritation and injury to the rectum are liable to follow where rough or unskilled attempts are made. For these reasons, rectal feeding should not be entrusted to members of the family, but the physician himself should see that it is properly done. In hospitals or in private practice where a trustworthy trained nurse is in charge, general directions may be given, but it is safer in all cases to leave explicit written orders. We mention these precautions for the reason that once the rectum becomes irritated, the process is conducted with great difficulty.

We refer here to the ordinary syringe with the short nozzle only to condemn it. For use in children a No. 12 or 14 "velvet-eyed," flexible catheter may be used, but for adults a full-sized rectal tube having a caliber of one-half inch should be employed. The rectal tube should be sufficiently rigid to free itself and not bend, or kink if it catches in a fold of mucous membrane, and yet must not be so stiff as to cause pain or to damage the bowel when introduced. Olive oil or vaseline may be used for

lubricating, but never glycerin, which tends to excite peristalsis. The distance the rectal tube can be inserted into the colon is a more or less mooted question. Some authorities claim to be able to reach the transverse or even descending colon, while others (Nothnagel, Boas) maintain that the tube invariably coils upon itself in the dilated portion of the rectum. Lilienthal and Rosenberg, with the aid of the sigmoidoscope, claimed to be able to pass a soft tube as far as the middle of the sigmoid but no farther, the greatest distance being about 12 inches. In a series of experiments carried out by Soper with a patient on the side and in the knee-chest position, he found that the tube invariably coiled up in the ampulla, or dilated portion of the rectum. He observed this coiling of the tube by radiographic pictures(30). He asserts that the rectal tube seldom passes more than six or eight inches into the rectum without kinking, that to force it farther causes buckling of the tube and obstruction of the flow of the liquid into the bowel, and that this obstruction tends to stimulate contractions of the circular fibers of the gut resulting in evacuations, which undoubtedly is one of the causes of failure of retention of nutrient enemata when given "high."

Our usual practice is to introduce the tube a distance of six or eight inches. This is high enough to prevent the ejection of the fluid and brings it in contact with a large mucous surface of the bowel. The anatomical arrangement and blood supply of the upper end of the rectum and lower sigmoid is as follows: The blood returned from the colon, sigmoid flexure, and superior hemorrhoidal veins, enters the vena cava, and products absorbed by these latter veins do not pass through the liver but enter the vena cava direct, while substances absorbed higher up pass through the vena porta, thence to the liver and are there further elaborated.

If sugar is added to nutrient enemata it should be given high, because if absorbed by the inferior hemorrhoidal veins it enters the vena cava and general circulation without passing through the liver and may cause glycosuria. Sugar solutions are best administered drop by drop after the Murphy Drip Method, which will be described later. Sugar should not be administered more than twice daily, and should not be of greater concentration than 10 per cent, owing to its tendency to irritate the bowel and cause cramp-like pains.

An apparatus can be rigged up in a private home suitable for administering rectal enemata by attaching an ordinary fountain syringe to a rectal tube. The whole appliance should be heated to a temperature of about 100° F. so as to prevent chilling the nutrient to be introduced. It must be borne in mind that fluids too hot or too cold are promptly expelled; an

enema of about 90° to 95° F. is in the neighborhood of the proper temperature. When everything is ready, the tube should be filled with fluid before introducing, to insure the exclusion of air, which, if allowed to enter the bowel through careless technic, tends to stimulate peristalsis,

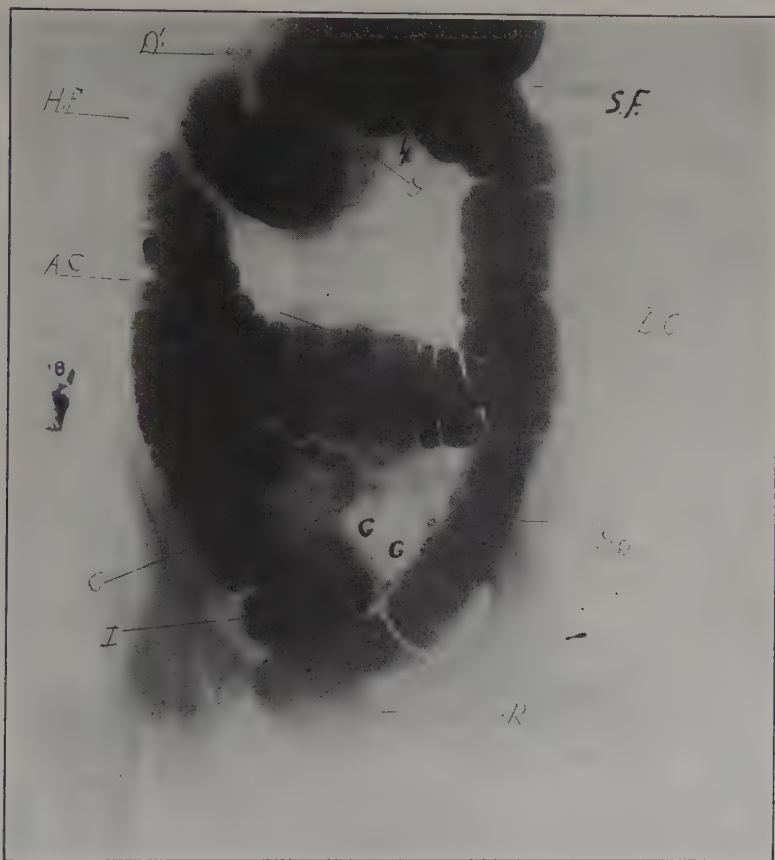


FIG. 6.—STOMACH DISTENDED BY A RECENT MEAL AND THE COLON BY AN ENEMA.

There are deep waves of gastric peristalsis and the stomach is distended on its greater curvature at X by adhesions between it and the splenic flexure of the colon. There is escape of the enema through the ileocecal valve into the lower ileum, which is indicative of ileal stasis. Further proof of this occurs in the presence of quantities of gas in the ileal coils at G. The terminal ileum marked I is greatly dilated and permits absorption of food residue in excess.

and hence evacuation. The injection should be given very slowly because rapid infusion also stimulates unwelcome peristalsis. The tube should be withdrawn before it is completely empty.

One of the first essentials for absorption by the colon is cleanliness within. The colon and sigmoid flexure are usually filled with feces and débris, and the walls of the gut are covered with mucus. In such a condition it is impossible for osmosis to occur. Therefore, before any nutrient enema is introduced, the colon must be thoroughly emptied and cleansed. A large cleansing enema of soapy water, from at least one to two quarts in quantity, should be given once daily to wash out the débris and fecal matter from the lower bowel. Personally, we recommend in addition that the rectum be gently irrigated before each feeding by running in eight ounces of weak boric acid solution by means of the rectal tube and fountain syringe. After it has remained in for a few minutes, disconnect the fountain syringe without removal of the rectal tube and allow the water to escape. Repeat the process three or four times until the return fluid is quite clear. The last time, the eye of the catheter should be withdrawn to quite near the internal sphincter to insure that no fluid remains before administering the nutrient enema. The reason for using boric acid solution as a clysmic enema is to allay the inflammation. The last clyster may have sodium chlorid added sufficient to make the strength of a normal saline solution. The proper temperature of the flushing solution is a matter of some difference of opinion. Tuttle recommends cold water, which he found to act more promptly and in his opinion left the bowel more tolerant to the succeeding nutrient enema. Our own preference, however, is for solutions of nearly the body heat, as they cause less reaction and congestion of the colonic mucosa. An important point in the preparatory technic is to cleanse the bowel for some time previous to administering the nutrient enema, usually about one hour, which allows the patient time for absolute rest. The correct position of the patient is important. The left lateral prone, with the hips elevated, is usually the position of election, but in a nervous or hysterical patient the knee-chest position is desirable. When everything is ready, the tube should be introduced with a slight twisting or boring motion to avoid the tip becoming entangled in the folds of the mucosa; should it meet resistance, a little of the fluid may be allowed to escape, which will dilate the gut and allow the tube to proceed, after which it can be pushed as high as desired to bring the fluid into contact with a large amount of mucous membrane.

The consensus of opinion of reliable authorities is that the introduction of the nutrient injections should be as high in the bowel as possible, but repeated observations have convinced the author that rectal tubes similar to stomach tubes almost invariably turn so as to discharge down-

ward near the anus, or assume a spiral course so as to reach no higher than a few inches above the internal sphincter, and that tubes of a large diameter and heavy walls, which can neither buckle nor curve in a spiral, cannot be successfully introduced more than four to six inches, at least not higher than eight inches. Of course, with the aid of a sigmoidoscope a much higher level can be attained. By means of a fluoroscopic examination, using a stillette or some similar opaque device, or even with digital touch, one can actually prove the possibility of high injections, but even with the aid of the X-ray, success in administering high injections is extremely rare, good authority to the contrary notwithstanding.

For high injections, the high introduction of a tube of any sort is quite unnecessary. When fluid is run three feet from a funnel or a douche can, under a steady pressure through a tube, into the intestine, it will reach the cecum without difficulty, as is demonstrated daily in any complete Röntgen laboratory. It is quite unnecessary to assume any special position or series of positions which are usually suggested. The fluid runs in easily when the patient lies on the back. Low pressure injections are passed into the pelvic colon with difficulty sometimes on account of that organ being held in the pelvis, and its flexure with the rectum being acute. Increasing the pressure for a few moments will overcome the resistance, and fluids will reach the cecum in a short time. Any tube which passes the internal sphincter muscle is quite long enough for a "high injection."

Under ordinary conditions the quantity of a nutrient enema should not exceed four ounces, but in some cases it would probably cause less irritation to give half a pint three times daily, than to give four ounces every four hours. Many recta, especially in women, tolerate half a pint without discomfort.

Ewald(31) is in the habit of ordering an enema of 250 c.c. in quantity two or three times a day, diminishing the bulk and increasing the frequency when necessary. He orders a teaspoonful of flour cooked with a 20 per cent glucose solution; 2 or 3 entire eggs are stirred in after the mixture has cooled enough to avoid coagulation, and 50 c.c. of claret are added. He directs that 1 gram of sodium chlorid shall be added to each egg. Three such injections represent 1,500 calories and about 25 grams of protein. He adds the flour to render the emulsion of the eggs more complete rather than for any energy value to the nutrient. The chief food constituents of value for rectal alimentation may be tabulated as follows:

PROTEINS

Milk.

Beef juice.

White of eggs.

Concentrated proteins, such as Plasmon, Casein, Somatose, and the like.

CARBOHYDRATES

Dextrose.

Milk sugar.

FATS

Yolks of eggs.

Most authorities advise the addition of common salt to enemata as an aid in osmosis. The addition of alcohol, notably in the form of whiskey or brandy, is also of much value in the treatment.

Leube advises scraped lean meat, 2 parts, and scraped pancreas, 1 part, to insure digestion:

Pancreas.....	100 grams....	300 calories
Lean meat.....	225 "	300 "
Fat, yolks of three eggs.....	37 "	150 "

The mass may be further macerated and softened by rubbing in a mortar with a little warm water to which 1 gram of salt should be added for each ounce of meat mixture. This mixture is semi-solid and should be given in four feedings by a large piston syringe with a comparatively large nozzle. It would represent about 250 grams of protein, with an energy value of from 700 to 800 calories.

Grunbaum(32) has successfully used nutrient enemata composed of ex-serum,¹ 2 grains of chloretone being added to each ounce of the serum to act both as a sedative and a preservative. He uses 90 c.c., equal to 3¼ ounces, which he injects every four hours; this yields 38 grams of protein daily. By the addition of 60 c.c. (2 ounces) of milk, the total protein is raised to 51 grams per day. He reports that this mixture does not cause any irritation and is very well absorbed.

The patient's constitution and general condition must be considered when directing the number of enemata to be given daily. As a general rule, five, or better, six hours should elapse between feedings. If the patient is a female and for any reason vaginal tampons or other gynecologic dressings still are in place, they may, if not removed, interfere very

¹ Supplied by Parke, Davis & Co.

materially with the injection of the fluid into the bowel and its retention afterward.

Friedenwald and Ruhrah advise that the patient's mouth be kept scrupulously clean. They are in the habit of allowing the mouth to be rinsed with water from time to time, which helps to allay thirst. Under some circumstances a small quantity of water may be swallowed, but where absolute rest of the stomach is indicated, not even this should be allowed. Where there is great thirst an injection of weak salt solution may be given subcutaneously. Besides the value of nutrient enemata from absorption, which produces a mental satisfaction similar to that following a meal, the patient feels that he is not being allowed to starve.

In order to prevent the occurrence of parotitis during rectal feeding, Fenwick is accustomed to direct his patients to chew on an Indian rubber teat about two inches in length. This will promote continued secretion of saliva, which will keep the ducts from the salivary glands open and the mouth will remain clean and moist. He has used this simple device in more than three hundred cases, and where the salivary glands are not already inflamed, he has had no trouble in this particular.

It sometimes happens that the patient will have a good deal of difficulty in retaining nutrient enemata. This may be caused from carelessness or rough handling of the rectal tube or from various other causes. Under such conditions, the following precautions should be observed: Introduce the enema very slowly, having it at the body temperature; introduce through a narrow catheter as high in the rectum as possible, with the patient lying on his left side. Immediately the rectal tube is withdrawn, firm pressure with a folded napkin should be exerted over the anal region. If, after observing these precautions, the irritability in the rectal pouch is such that the patient cannot hold the aliment, it may be overcome by the addition of 10 to 15 drops of laudanum. If possible, it is best to get along without an opiate for this purpose, since it interferes slightly with the absorption of the food and exerts a regular systemic effect on the patient.

Foods for Rectal Enemata.—All foods entering into nutrient enemata should be partially predigested before being introduced into the rectum. Milk should always be peptonized and alcohol should not be stronger than 1.6 in the fluid enema. A small amount of salt should invariably be added to nutrient enemata composed of milk, beef juice or eggs. In peptonizing proteins for rectal alimentation, the pancreatic ferment trypsin should be used, because peptonization with trypsin takes place in alkaline medium, while peptonization with pepsin takes place in acid medium only. A mix-

ture of peptone and protease in solution may be given. However, the peptonizing process may take place within the rectum if macerated pancreas or pancreatic extract is mixed with the food. Preparations of pancreatin, representing the pancreatic ferment, are easily obtainable and may be readily mixed with the aliment during its preparation. The peptonizing process starting in the warm food material outside the body will continue as absorption progresses until the whole mass is peptonized.

Milk is much used in rectal alimentation, but it should always be peptonized through the use of pancreatin before injection, as the casein otherwise is not readily absorbed. Even hashed raw beef mixed with pancreatin and reduced to a pulstaceous mass diluted with several volumes of normal saline solution, may serve as a source of protein food. Unchanged fats, such as olive oil, cream and butter, seem not to be well absorbed by the rectal mucous membrane. According to Hall(33), it is useless to introduce fats in any form, as he claims they not only fail to be absorbed, but that their presence interferes with the absorption of other foods. He even claims that the yolk of egg contains too much fatty substance to make it favorable for repeated feedings as a rectal food. We hardly think his objections well grounded in view of the fact that other observers find that fats are metabolized. Sugar, as previously stated, is most readily absorbed by the rectal mucous membrane, but it should be given in dilute solution. When peptonized milk is used, the milk sugar represents about the proper strength, and no more sugar should be allowed. When raw beef juice or white of egg is used, sugar may be added up to the proportion previously suggested. Some authorities advise nutrient enemata containing wine, but inasmuch as wine interferes somewhat with the absorption of other foods, we do not consider its admixture with an enema wise. When it is advisable to administer alcohol, the best results are obtained when it is given in a separate enema with the rectum free from food; it should be diluted with normal saline solution and should not exceed four or five per cent in strength.

Below we give a few formulæ for nutrient enemata that have proved successful in the hands of the authorities mentioned:

Warren Coleman recommends:

Dextrose.....	20-30 gm.....	80-120 calories
Water.....	200-300 c.c.....	
Dextrose.....	20-30 gm.....	80-120 calories
Wine (white or red).....	15-30 c.c.....	10- 20 "
Water.....	200-300 c.c.....	

Watson recommends:

Pancreatized milk	6 ounces	180 c.c.	186 calories
Eggs	1 whole	50 gm.	80 "
Brandy	1 ounce	30 c.c.	100 "
Water	1 ounce	30 c.c.	0 "
Salt	15 grains	1 gm.	0 "
Pancreatized milk	4 ounces	120 c.c.	125 calories
Peptone	1 ounce	30 c.c.	50 "
Salt	15 grains	1 gm.	0 "

Reigel recommends:

Whole milk	9 ounces	270 c.c.	174 calories
Eggs	2 whole	100 gm.	160 "
Salt	2 pinches	2 gm.	0 "
Red wine	1 ounce	30 c.c.	75 "

Tournier recommends:

Beef tea	5 ounces	150 c.c.	75 calories
Eggs	6 yolks	75 gm.	300 "
Red wine	1 ounce	30 c.c.	75 "
Salt	1½ teaspoonfuls	6 gm.	0 "

Boas recommends:

Milk	8 ounces	250 c.c.	170 calories
Eggs	2 yolks	25 gm.	100 "
Flour	½ ounce	15 gm.	56 "
Wine	½ ounce	15 c.c.	10 "
Salt	a pinch	1 gm.	0 "

Myer recommends:

Cream	8 ounces	250 c.c.	500 calories
Peptone	6¼ drams	25 gm.	50 "
Pancreatin	75 grains	5 gm.	0 "

Watson recommends:

Pancreatized milk	6 ounces	180 c.c.	186 calories
Eggs	2 whites	64 gm.	36 "
Milk sugar	2 teaspoonfuls	8 gm.	40 "

Army Hospital Formulæ:

Eggs.....	5 whole.....	250 gm.....	400 calories
Dextrose (20% solution).....	8 ounces.....	240 c.c.....	240 "
Salt.....	2 teaspoonfuls.....	8 gm.....	0 "

Add a little starch solution or mucilage to make it more viscid and a few drops of tincture of opium.

Huber(34) recommends:

Eggs.....	6 whole.....	300 gm.....	480 calories
Sodium chlorid.....	1½ teaspoonfuls.....	6 gm.....	0 "
Pepsin.....	Heaping teaspoonful	5 gm.....	0 "
Dilute hydrochloric acid.....	0.15%-7 ounces.....	210 c.c.....	0 "

Mix and place in a warm place for ten hours, and administer at 95° F.

The author has found the following formulæ to give good results:

Eggs.....	2 whole.....	100 gm.....	160 calories
Dextrose (pure).....	1½ teaspoonfuls.....	6 gm.....	30 "
Pancreatized milk.....	10 ounces.....	300 c.c.....	210 "
Common salt.....	½ teaspoonful.....	2 gm.....	0 "

The nutritive value of the enema is from 350 to 400 calories and may be given once in every 4 to 6 hours.

Minced lean beef.....	5 ounces.....	155 gm.....	230 calories
Peptonizing powder.....	F. B. & F.....	½ tube.....	0 "
Glucose.....	2 teaspoonfuls.....	8 gm.....	30 "
Brandy.....	1 ounce.....	30 c.c.....	100 "
Water.....	2 ounces.....	60 c.c.....	0 "
Salt.....	Teaspoonful.....	4 gm.....	0 "

Ewald recommends:

Wheat flour.....	2 tablespoonfuls..	60 gm.....	224 calories
Whole milk.....	5 ounces.....	150 c.c.....	105 "
Eggs.....	2 whole.....	100 gm.....	160 "
Glucose, 15% solution.....	4 ounces.....	120 c.c.....	140 "
Claret.....	1 glass.....	180 c.c.....	30 "

Beat up flour, milk and eggs and add solution of glucose; continue beating and add claret.

Nutrient Enemata by the Drop Method.—No reference to rectal alimentation would be complete without mention of the Murphy Drip Method first suggested by Dr. John D. Murphy of Chicago, and greatly improved upon by Robert Coleman Kemp of New York(35). This apparatus, first described by Kemp in 1909(36), consists of an ordinary thermos bottle

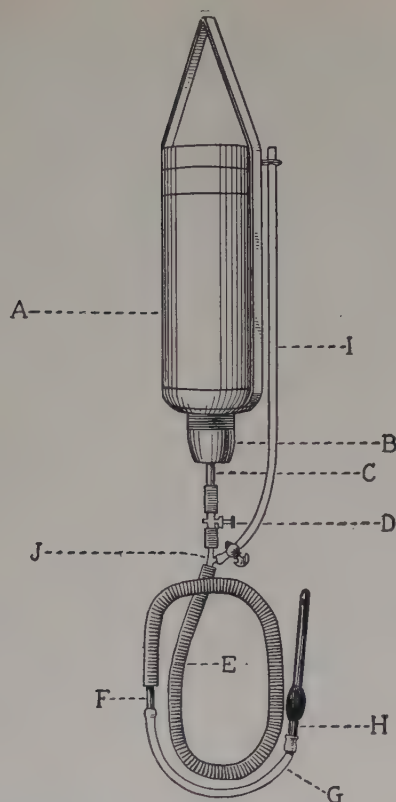


FIG. 7.—KEMP'S HEAT-RETAINING PROCTOCLYSIS BOTTLE.

(A) Inverted thermos bottle. Through the cap (B) which closes the bottle passes a hard-rubber conducting tube, to which is attached the outflow tube (E). Parallel with this is a filiform tube (C) which allows the entrance of a fine column of air, so as to render the flow possible. This last tube passes through the solution to within an eighth of an inch from the bottom of the bottle, and when the bottle is inverted, it will be the same distance from the top of the bottle. This filiform tube within the bottle is made of metal, so that it is rapidly heated by the surrounding solution, and the air thus entering is in turn heated. The screw compression valve (D) is applied close to the bottle, so as to avoid as much as possible the solution cooling the soft outflow tube. This outflow tube (E) is joined to the catheter (G) by a short piece of glass tubing (F) for the purpose of observing whether the flow is constant. The catheter for rectal injection passes through a self-retaining rectal tip (H), and the former can be inserted to any length desired. The conducting tube (E) is especially thick and surrounded by an asbestos jacket to lessen the dissipation of heat. The small tube (I) is connected with the outflow tube (E) by a T-shaped glass connection (J) which allows the escape of flatus.

so arranged that it can be inverted and connected with a hard rubber conducting tube to which is attached an outflow tube. Parallel with this outflow tube is a filiform tube which allows the entrance of a fine column of air, so as to render the flow possible. This filiform tube passes through the solution to within about one-eighth inch of the bottom of the bottle (as the instrument is employed bottom up, this corresponds to the same distance from the top of the bottle). Surrounding the conducting tube from its junction with the bottle to the catheter, is an asbestos jacket, which is intended to lessen the dissipation of heat. Kemp(37) has lately devised an improvement which consists of a short neck on the glass connection between the conducting tube and the catheter, to which is attached a very small rubber tube which allows the escape of gas, and thus prevents the catheter from being expelled.

The nutrient enema intended for use is placed in the thermos bottle at the desired temperature. The bottle is then suspended on a plane six inches or more above the rectum, and the flow tested for proper speed before inserting the rectal tip and catheter. We insert Kemp's table herewith, showing the temperature of the bottle, the length of the tube, the number of drops per minute, and the temperature at which the nutrient enema will be delivered into the rectum.

Temperature of water in bottle	Length of tube	Number of drops per Minute	Temperature in rectum
190° F.	30 inches	60	115° F.
160° F.	30 "	20 or less	100° F.
150° F.	30 "	40 to 50	100° F.
138° to 140° F.	30 "	150 to 200	105° to 110° F

An examination of the diagram and accompanying explanation will convey a very good idea of the ingenuity with which Kemp improved the Murphy Drip Method by using the thermos bottle. The rate of flow can be regulated anywhere from 60 to 200 drops per minute.

The following formulæ, recommended by Kemp, are well adapted for this method:

Eggs.	3 whites.	96 gms.	54 calories
Peptonized milk.	9 ounces.	270 c.c.	174 "
Table salt.	½ teaspoonful.	2 gms.	0 "
Warm milk.	9 ounces.	270 c.c.	174 "
Eggs.	2 yolks.	25 gms.	100 "
Grape sugar.	1 teaspoonful.	4 gms.	14 "
Table salt.	½ teaspoonful.	2 gms.	0 "

Warm milk.....	9 ounces.....	270 c.c.....	174 calories
Raw eggs.....	2 whole.....	100 gms.....	160 "
Essence of pepsin.....	2 teaspoonfuls.....	120 c.c.....	0 "
Table salt.....	½ teaspoonful.....	2 gms.....	0 "

Beat the eggs, salt and pepsin together. Have the milk previously heated from 98° to 100° F., gently stir the whole mixture together, and heat again until the mixture drops easily.

Another formula, recommended by Friedenwald and Ruhräh, is as follows:

Raw eggs.....	2 whole.....	100 gms.....	160 calories
Normal saline solution.....	1 pint.....	480 c.c.....	0 "

The drop method of administering nutrient enemata is indicated in persistent vomiting, in hemorrhages, in stenosis of the esophagus or pylorus, in carcinoma of the stomach and duodenum, and in most conditions in which nutrient enemata are usually employed.

Metabolism of Rectal Feeding—PROTEIN.—The metabolism of rectal feeding is of sufficient moment to demand attention at this juncture. Most of the teaching on the absorption and metabolism of albumin and proteins in general is based on Ewald's researches. His results are graphically expressed in chart form, which, however, is rather complicated and difficult to follow. Plantenga(38) investigated the absorption of albumin and found that a very small percentage was absorbed even when salt was added. Markwald, after considerable investigation, came to the same conclusion. Edsall and Miller(39) had two subjects under observation and found that the nitrogen absorption per diem equalled in one case 3.04 grams of nitrogen or 19 grams of protein; in the other, 3.8 grams of nitrogen or 23.8 grams of protein. The results of these authorities, after being carefully examined, emphasize the fact that albumin is poorly absorbed even when predigested and when salt is added.

Boyd reports(40) a series of observations on six cases of gastric ulcer treated by rectal feeding(41). In all of his cases the nutrient enemata were carefully pancreatized before administration, and complete analysis of the nutrient injections and of the urine and fecal matter excreted was made. In all of his cases the period of observation lasted one week. In the tables given below, the figures show the averages over the periods of observation expressed in grams per diem.

TABLE I

PROTEIN AND NITROGEN CONTENT OF FOOD—PROTEIN AND NITROGEN ABSORBED—CALORIC
VALUE OF ABSORPTION (AVERAGE PER DIEM)

ENEMA			ABSORPTION		
Observations	Protein	Nitrogen	Protein	Nitrogen	Caloric Value
i	71.43	11.43	9.52	1.54	39
ii	41.62	6.66	6.87	1.098	27
iii	49.06	7.85	10.52	1.7	43
iv	46.75	7.48	3.86	0.618	15
v	29.71	4.69	8.62	1.38	35
vi	30.6	4.9	13.87	2.22	56

Cases i to iv in Table I were given two eggs at each feeding. In cases v and vi, the white of one egg was used with milk. The amount of protein absorbed in all of these cases was remarkably small, especially in case iv. Boyd reports that the subject of this observation was a poorly nourished and somewhat nervous subject. He reports that cases v and vi were given a small amount of protein and that the absorption seemed to be as good as when a larger amount was given. His conclusion is that milk when used in an enema is very poorly assimilated by the bowel.

TABLE II

ABSORPTION OF NITROGEN PER KILO OF BODY WEIGHT

Observation	Nitrogen Absorbed	Body Weight in Kilograms	Nitrogen Absorbed per Kilo
i	1.54 grams	51.5	0.029 grams
ii	1.09 "	46.5	0.0234 "
iii	1.7 "	48.9	0.035 "
iv	0.61 "	50	0.012 "
v	1.38 "	45	0.03 "
vi	2.22 "	45	0.049 "
<i>Average</i>	1.42 grams		0.0297 grams

In Table II Boyd records the absorption of nitrogen per kilo of body weight per diem, and it will be seen that it is very small, the average being 0.0297 gram for the six cases. "The figure is far below even the minimum absorption, when nutrition balance is kept up in individuals even on a nitrogen-poor diet."

Table III shows the nitrogen balance in six cases of rectal feeding. The whole series, as noted, is markedly negative, the patients losing nitrogen continuously from the tissues.

TABLE III
NITROGEN BALANCE

Observation	Nitrogen Absorbed	Nitrogen of Urine	Balance
i	1.54 grams	3.27 grams	—1.73
ii	1.098 "	5.5 "	—4.408
iii	1.7 "	2.4 "	—0.98
iv	0.61 "	6.31 "	—5.69
v	1.38 "	6.87 "	—5.49
vi	2.22 "	8.12 "	—5.89

From the observations recorded by Boyd, it must be conceded that:

(a) Protein food, even when predigested and with salt added, is very poorly absorbed in rectal feeding.

(b) The albumin of eggs, as generally used in rectal feeding, is a very expensive and unsatisfactory foodstuff.

(c) There is no relation between the amount of protein injected and the amount absorbed. Absorption seems to depend more on the patient's individual capacity for absorption than on the amount of protein food given.

FAT.—The metabolism of fat, although previously considered, will be further elaborated here. Much of our information on the subject of the metabolism of fat in the rectum is based on the work of Munk and Rosenstein. The subject of their observations had a lymph fistula through which the absorbed chyle was collected. This patient was kept on a fat-poor diet and sustained on enemata of an emulsion of 15 grams of lipanin, in 0.4 per cent saline solution. The lymph collected and examined showed an increase in fat percentage from 0.18 to 0.45, a little more than 3½ per cent of the oil being absorbed. In a second observation the amount of the hunger lymph was estimated, a cleansing chyster administered, followed by an enema of 20 grains of lipanin in 0.4 soda solution. Boyd records a rise of fat from 0.06 to 0.37-per cent, which after nine hours was still 0.23 per cent. Robert and Koch "found that emulsified fat was slowly absorbed in small quantities, while unemulsified fat was but little absorbed." Munk and other observers, from clinical experiments, are convinced that the lower the melting point of fat, the more readily it is absorbed. Boyd outlines a table showing the average absorption of fats per diem:

TABLE IV
AVERAGE ABSORPTION OF FATS

Observation	Fat of Enema in Grams	Fat Absorbed in Grams	Percentage of Absorption	Caloric Value
i	103.37	45.85	44	426
ii	47.44	23.87	51	222
iii	40.24	14.46	35	134
iv	39.61	5.45	12	50
v	9.18	2.55	..	23.71
vi	14.35	3.47	24	32

In the observations recorded in this table, Boyd estimated the fats by weight after extraction with ether; "therefore the figures given may be more correctly termed 'ether soluble bodies.' The maximum of absorption, 45 grams in the subject recorded in observation i, was where the maximum of 103 grams was given in twenty-four hours." It will thus be seen that considerable fat absorption was secured following the administration of a large amount of fat in the enema. The subject in observation iv absorbed 5.45 grams of fat, equal to 13 per cent, as compared with the record of the subject noted in observation iii. Boyd's conclusion on observation v, a chlorotic young woman, "was either that the fat absorption was practically *nil* and the surplus amount recovered was accounted for by the digestive secretions, or that some unauthorized article of food was taken by mouth, which was stoutly denied by both patient and nurse."

Table V shows the loss of nitrogen of tissues and loss of weight in relation to fat and sugar absorption. In studying this table, it will be interesting to note that fat absorption seems to play an important rôle as a nitrogen saver.

TABLE V
LOSS OF NITROGEN OF TISSUES—LOSS OF WEIGHT IN RELATION TO FAT AND SUGAR
ABSORPTION (AVERAGE PER DIEM BY THE PATIENT)

Observation	Nitrogen of Tissues	Loss in Weight in Kilos	Fat Absorbed	Sugar Absorbed	Caloric value of Absorption
i	1.73	0.378	45.85	43.8	606
ii	4.4	0.245	23.87	38	378
iii	0.98	0.405	14.46	61.85	388
iv	5.69	0.518	5.45	50.61	258
v	5.49	0.583	2.55	81.1	308
vi	5.89	0.778	3.47	36.96	184

An examination of this table shows that the loss of nitrogen for the six observations was much greater in the subjects where fat absorption was poor. Altogether, the table emphasizes the fact that emulsified fat is of much value as an ingredient in rectal enemata and is much more readily absorbed than is generally believed.

SUGAR.—The absorption of sugar has been studied at length by Voit(42), Bauer, Schoenborn, Strauss, Leube, Plantenga(43), Deucher and others. Deucher administered to a patient, within nineteen hours, five enemata, each containing 40 grams of sugar, 77 per cent of which, or 154 grams, was absorbed. Plantenga's results coincide with Deucher's findings. Zehmisch administered 152 grams of sugar in a rectal enema, and after examination it was proven that his patient had absorbed 103 grams. These conclusions were drawn from a known amount of sugar in the enema and the calculated amount of sugar or dextrin recovered from the stool, the difference being taken as the measure of absorption. According to Boyd, Reach in a series of experiments found that 60 grams of dextrin given by the mouth raised the respiratory quotient, while the same quantity given in rectal enema did not affect the respiratory quotient. His conclusion is that the amount of sugar absorbed from rectal aliment is considerably below the amount absorbed when ingested orally. He believes dextrin is better absorbed by the bowel than sugar, and causes far less irritation. He also declares that Reach's observations cannot be accepted as conclusive, and that his opinions as to the demolition of the sugar molecule are wholly theoretical. The nitrogen lost due to bacterial action is very small, being less than one per cent. The observations of Kausch, in a measure, support this view. He proved by animal experimentation that milk sugar and galactose, when administered per rectum, appeared in the liver and were converted into glycogen.

Table VI shows the absorption of sugar:

TABLE VI
AVERAGE ABSORPTION OF SUGAR PER DIEM

Observation	Sugar of Enema	Sugar Absorbed	Caloric Value
i	47.75	43.8	179
ii	38	38	155
iii	61.85	61.85	253
iv	57.12	50.61	207
v	88.14	81.1	332
vi	39.08	36.96	151

The record of the subjects as delineated in this table shows the amount of absorption obtained. In observation iii, 61.85 grams of sugar were administered daily, with complete absorption. In observation v, 88 grams were administered and 81 grams were absorbed. The percentage of absorption varies in the different cases, depending largely upon the absorptive power of the individual. The caloric value obtained ranged from 151 calories as a minimum to 332 as a maximum. Boyd does not record the presence of any irritation produced by the dextrose, a disadvantage which many authorities have recorded against its use. He is of the opinion that when pure dextrose is used the liability of bowel irritation is practically *nil*, and the liability of alimentary glycosuria is remote, but, of course, a dextrose containing impurities such as sulphuric acid is liable to induce irritation of the bowel with alimentary glycosuria.

CALORIC VALUE OF FOOD ABSORBED.—In Table VII the relation between the caloric value of food given and the caloric value of food absorbed and the loss of weight in the subject are shown. The experiments recorded in these several tables show fairly well the correctness of the observation data:

TABLE VII

RELATION BETWEEN FOOD CALORIES USED AND LOSS IN PATIENT'S WEIGHT—AVERAGE PER DIEM

Observation	Food Calories	Calories Used	Loss of Weight in Grams
i	1,777	645 = 35 per cent	367
ii	939	405 = 48 "	246
iii	869	431 = 49 "	405
iv	894	273 = 30 "	519
v	567	344 = 60 "	584
vi	428	240 = 56 "	892

An examination of this table will show that a much larger amount of food was administered in observation i than was allowed in observation vi, while the second column points out the diminishing ratio of calories absorbed from observations i to vi. The percentage of absorption, however, is not in proportion to the amount of food administered. In observation i only 35 per cent of food was absorbed. In observation v only 344 calories were observed, but the proportion was 60 per cent of the amount administered. Another feature of this table shows the loss of weight of the subject from i to vi. In proportion to the food given, for instance, when little food was absorbed, the loss of weight was greatest.

SUMMARY.—A canvass of the clinical results of various authorities, together with our own observation, leads us to the following conclusions:

(a) First, we get from rectal feeding only about one-fourth of the nourishment required to maintain equilibrium, even if a reduced standard of nutritive requirements be accepted. (b) Even under the most favorable circumstances, metabolic experiments in rectal feeding show that it is a sub-nutrition of a most pronounced character. (c) There is little chance for a patient suffering from esophageal or pyloric obstruction to be brought into a condition of improved nutrition before operation. (d) The gains in weight on rectal alimentation are misleading, for in reality, it is merely the absorption of water from the rectum which has produced the gain. (e) The metabolic experiments show that the greatest percentage of absorption in rectal alimentation is obtained from carbohydrates and hydrocarbons. The absorption of protein by the bowel is so small as to make it of little value as a foodstuff. (f) A study of the metabolism of rectal feeding leads to the conclusion that its field of usefulness is more limited than is at present recognized by clinicians. (g) However, it offers a method of nourishment sufficient to tide the patient over a critical period and to prevent an undue strain upon the tissues. (h) It is a dietetic measure which, if used with painstaking care and intelligence, will prove helpful alike to the patient and the physician.

DUODENAL FEEDING

Duodenal alimentation is a method of artificial feeding which eliminates both mastication and insalivation of food, entering the duodenum directly through a small tube without touching the stomach, which is kept completely empty and at rest. Einhorn(44), Gross and Held(45), Rosenbloom(46), and others, following the teaching of the first named investigator, have reported their experiences with the use of the Einhorn "duodenal pump," not only as a diagnostic aid, but for feeding in difficult cases. The method consists simply of introducing into the stomach a thin rubber tube tipped with a "duodenal pump." The technic is as follows: The tube is placed in the mouth and gently pushed into the throat while the patient swallows a small glass of water, care being exercised that the patient swallows slowly, causing rotation, which allows the tube to be taken directly into the stomach. Usually within two or three hours in normal individuals the "duodenal pump" has slipped into the duodenum.¹

¹ Einhorn reports one case with spasm of the pylorus where it took twenty-four hours for the pump to reach the duodenum.

According to Einhorn(47), this can be positively determined by allowing a little liquid food by mouth (the thin rubber tube does not cause much inconvenience in swallowing or talking) and, with a syringe attached to the tube, aspirating a portion and examining it. "If the pump is in the stomach an acid liquid will be aspirated; if the pump is beyond the pylorus, in the duodenum, it will be very difficult to obtain any fluid, the duodenum being empty." Einhorn points out another method of determining if the pump is beyond the pylorus, which consists of introducing air through the tube. If the pump is still in the stomach, the patient will feel the air, if in the duodenum, there is no sensation of air felt. Another method is to add a small quantity of methylene blue to a little water and aspirate; if the pump is beyond the pylorus no water will be obtained, but if it is in the stomach a bluish liquid will be secured. As soon as the duodenal pump reaches the duodenum the feeding may be commenced. The apparatus can be kept *in situ* for from 10 to 15 days, and feedings given at intervals of every two hours from early morning until late at night. The following nutritive materials are recommended by Einhorn:

Whole milk.....	1 cup, 8 ounces..	250 c.c.....	170 calories
Egg.....	1 whole.....	50 gm.....	80 "
Lactose.....	1 tablespoonful..	15 gm.....	60 "

The mixture is well beaten up and injected at the body temperature; cream may be added to increase the nutritive value. This will supply about 300 calories every two hours and 8 feedings in the 24 hours will yield an energy value of about 2,400 calories daily, which is ample for the average patient at rest in bed.

During the first two or three days there may be some nausea or retching, a feeling of distention, and even the expulsion of the tube. Einhorn prefers a thin tube, for the reason it is better tolerated by the patient, but it is not so difficult to give the feedings when a tube of larger caliber is used. The Einhorn pump has been perfected with a special syringe with which food may be administered without disconnecting the tube.

Einhorn reports more than one hundred cases of ulceration of the stomach and duodenum treated with this method. He watched the weight of his patients very carefully and, as a rule, was able to keep them from losing weight. He claims that the stomach is kept empty and at rest, an important factor in curing this disease as well as in reducing dilatation. According to Einhorn the indications for the method are: (a) Ulcus ventriculi, or duodeni; (b) dilatation of the stomach without organic obstruction; (c) nervous vomiting and obstinate vomiting of pregnancy;

(*d*) atony of the stomach; (*e*) diseases of the liver with faulty metabolic products in the circulation, cirrhosis; (*f*) inoperable cancerous conditions where the pylorus is not closed and the duodenum can be entered by the pump.

The advocates of duodenal alimentation claim it a step in advance over rectal feeding, especially in ulcers of the stomach and duodenum. These organs can be placed at rest, while sufficient food is introduced directly

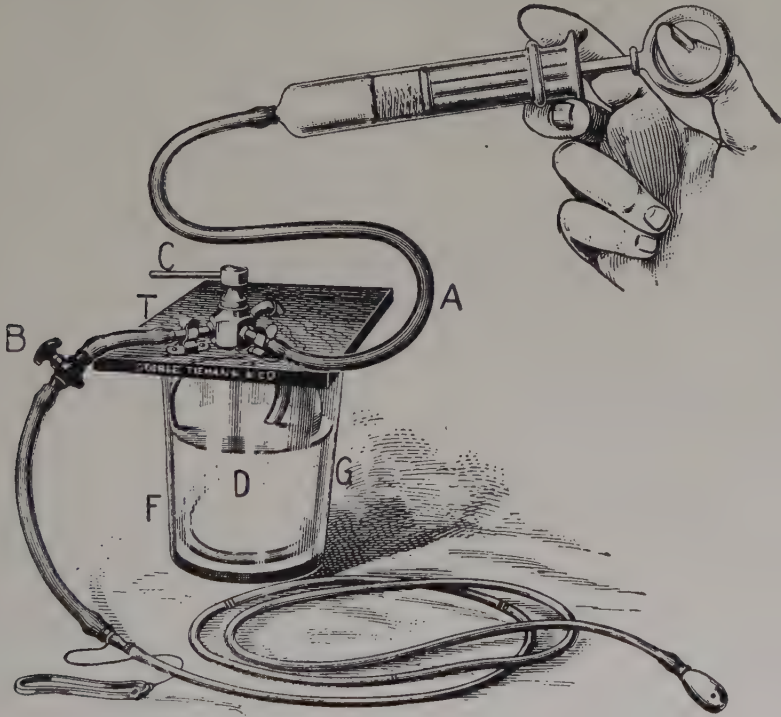


FIG. 8.—THE EINHORN DUODENAL FEEDING APPARATUS, WITH TABLE SUPPORT.

A, Tube leading to syringe; B, tube leading to duodenal pump; C, crank; D, tube leading to fluid; F, fluid; G, glass; T, table support or shorter support. When crank C is turned parallel to A, fluid can be aspirated from the glass into the syringe. When C is moved parallel to B, the fluid from the syringe can be emptied into the duodenum.

into the small intestine, where it can be well digested and assimilated. The chapters on the "Physiology of Digestion," Volume I, Chapters VI and VII, outline the processes of digestion and food metabolism, and the reader should study these carefully in order to have an exact understanding of the subject.

The researches of Pavlov and his pupils, confirmed by those of Cohnheim and his co-workers, emphasize the physiological fact that the intestinal juices are stimulated by local irritation, but that ferments and hormones are not increased proportionately with the secretions(48). However, it has been established that when food is introduced directly into the intestine, secretions with the necessary corresponding ferments are stimulated, which seems to justify duodenal feeding. It must be granted that the intestinal ferments are not so extensive in their action as the pancreatic juice, which is absolutely essential, even if the food is directly introduced into the small intestine.

Gross and Held(49), with Hamberger, Heckman and others, conclude that absorption of intestinal juices in one part of the small intestine stimulates secretion of active ferments in another part reflexly through the nervous system, or by way of the blood; therefore, it is reasonable to suppose that when aliments reach the duodenum, even by way of a tube, pancreatic secretion is stimulated and digestion promoted. Some authors claim that in rectal alimentation it is found to be a physiological fact that food in a rectal enema causes an increase of secretions in the stomach. Reasoning from analogy, we may assume that the gastric secretions are also stimulated by duodenal feedings. If this is the case, rest intended for the stomach is not complete, the statement of Einhorn(50) to the contrary notwithstanding.

While considering the "Mechanical Processes of Digestion" (Volume I, Chapter IV), we called attention to the rhythmic contractions of the small intestine, which, according to Cannon, "bring the digestive juices into more accessible relations with the food." Physiology teaches that the food should reach the duodenum in a predigested state—from admixture with the gastric and pancreatic juices. When such is not the case, the rhythmic contractions are slower, in order to give the intestinal juices more time to cope with their unaccustomed task.

With these facts before us—the presence and functions of the different intestinal ferments and hormones, their increased flow, stimulated by the introduction of food, and the adaptation of the rhythmic contractibility of the small intestine to the contents—it is readily seen that alimentation by the duodenal tube is a very effective method of supplying energy to maintain body weight.

Einhorn and Rosenbloom¹ carried out a series of experiments(51) in

¹ From the Wards and Chem. Lab. of German Hospital, New York City, and the Laboratory of Biol. Chem. of Columbia University, at the College of Physicians and Surgeons, New York City.

the wards of the German Hospital, New York City, to determine the exact nitrogen balance of patients subsisting on duodenal alimentation. "The patients were afflicted with ulcer of the stomach complicated with pylorospasm. They each had eight feedings daily—one every two hours, consisting of eight ounces of milk, an egg, and one or two tablespoonfuls of milk sugar well mixed and strained before being given. The results obtained after two weeks of duodenal feeding are shown in the accompanying table, showing clinically the records of the examination of the urine, feces, nitrogen ingested and excreted, and nitrogen balance in a typical case."

TYPICAL CASE OF GASTRIC ULCER SHOWING TOTAL NITROGEN INGESTED, EXCRETED,
AND NITROGEN BALANCE

Weight of Patient at Beginning of Treatment, 146 lbs.; at end of two Weeks' Treatment, 146 lbs.

(Date) 1910	Total Nitrogen			Volume	Total Nitrogen	Found	Urea Nitrogen Per cent of total Nitrogen in urine	Found	Ammonia Nitrogen Per cent of total Nitrogen in urine	Found	Feces Total Nitrogen Per cent of total Nitrogen ingested.
	Ingested	Excreted	Balance								
June 17	15.5	16.33	-0.83	595	14.93	12.80	85.8	0.48	3.2	1.4	9.03
June 19	15.5	15.16	-0.34	565	13.76	11.30	82.1	0.51	3.7	1.4	9.03
June 20	16.4	16.80	-0.40	630	15.40	13.16	85.4	0.48	3.1	1.4	8.54
June 21	16.3	13.51	-2.79	445	12.11	10.40	85.9	0.47	3.9	1.4	8.59
June 24	16.4	15.31	-1.09	650	13.91	11.60	83.4	0.62	4.4	1.4	8.54
June 25	16.6	14.16	-2.44	730	12.86	11.08	86.2	0.38	3.0	1.3	7.83
June 26	16.4	14.70	-1.70	870	13.40	11.40	85.1	0.58	4.3	1.3	7.93
June 27	16.2	14.22	-1.98	860	12.92	10.98	84.9	0.54	4.2	1.3	8.02
June 28	16.0	12.72	-3.28	940	11.42	9.71	85.0	0.56	4.9	1.3	8.12
TOTAL..	145.3	132.91	-12.39								
AVER...	16.144	14.767	-1.376								

Gross and Held, writing on duodenal alimentation(52), describe a tube which they consider an improvement over the Einhorn tube, being heavier and fitted with a duodenal pump weighing from 10 to 11 grams, while the Einhorn pump weighs but 2.5 grams. The Gross weighted tube finds its way into the duodenum by the force of gravitation. According to published reports of Holzknecht of Vienna(53), Lippman of San Francisco(54), and others, the Gross tube is inserted with much more ease than the Einhorn tube. With changes of position to favor gravitation, it is

claimed that the tube will find its way into the duodenum within twenty minutes. About the same quantity and variety of food constituents as suggested by Einhorn are advised. The advocates of this method begin with the formula previously credited to Einhorn and on the fourth day add the yolk of one egg three times daily, giving an additional 174 calories. If this is well tolerated, on the fifth and sixth day they add the yolk of an egg at each feeding, which supplies an additional 232 calories. On and after the seventh day they usually allow the whole egg at three of the feedings, which supplies 240 additional calories. When a patient complains of excessive thirst he is allowed water by the drop method through the duodenal tube, or saline solution by proctoclysis. Usually patients do not complain of very much thirst for the reason that they get sufficient fluids from the milk; beside this, it is necessary to use about 50 c.c. of water before each feeding to cleanse the tube, which gives the patient about 350 c.c. of plain water in the 24 hours. After the tube is removed, the patient may be allowed to return gradually to a full diet. On the first two days he receives milk, sweet cream and half a dozen eggs. The following day toast and butter and fine cereals or porridge are permissible. On the sixth day, the patient may have a full convalescing diet, and after this time he can return to his business.

SUBCUTANEOUS FEEDING

When alimentation by the mouth is contra-indicated or impossible, rectal feeding may be impracticable from disease of that organ preventing the retention of the nutrient, or, in the case of the insane, from the inability of the patient to coöperate with the physician. Duodenal alimentation may be impracticable or impossible for similar reasons. Under such circumstances, attempts have been made to sustain the patient by the subcutaneous or intravenous introduction of foodstuffs.

Hypodermoclysis.—Hypodermoclysis is the method of injecting normal saline solution into the subcutaneous tissue. The technic is simple and comparatively safe. In order that the reader may not question the degree of safety, the term "comparatively" is used advisedly, as Kemp(55) reports a case of abscess beneath a woman's breasts as a result of hypodermoclysis. The sloughing was so extensive that both breasts had to be amputated. Kemp thinks the injection was administered too rapidly, and in too large quantity.

The site for the injection, according to Kemp, is the ilio-lumbar region. There have been many sites advocated as the point of election for hypo-

dermoclysis, such as beneath the breast, in the chest, abdomen, thigh, axillary space, cellular tissue of the neck and back, etc., but the ilio-lumbar region appears especially advantageous—the space between the highest point of the crest of the ilium and the lower border of the ribs, in reality—in the *loin*, i. e., the outer margin of the lumbar region, which for convenience is referred to as the “ilio-lumbar.” This location is ideal, since it does not interfere with the free movement of the limbs or neck, nor does thoracic and abdominal respiration give discomfort.

Care should be exercised to see that the field is prepared as for an operation—that the fluid should flow from the point of the needle at the moment of puncture; that the fluid flows slowly, so that the tissues are not overdistended, and that the needle should be withdrawn before the flow stops to prevent the entrance of air into the tissues. The temperature of the solution should be about 110° F. The amount usually employed is 8 ounces, repeated in the opposite ilio-lumbar region in twelve hours.

Subcutaneous Administration of Food.—Subcutaneous feeding, or the administration of nutritive substances beneath the skin, was first introduced by Menzel and Perco(56) in the year 1869; but it remained for von Leube in 1905(57) to give the method prominence by demonstrating its apparent utility and simplicity by describing his results from the subcutaneous administration of oils and fats as a means of supplying the body with nutriment. Mills(58), after considerable clinical research in Lusk's laboratory, reports his findings on which some of the following statements are based:

Food to be available for subcutaneous administration should fulfil the following three conditions:

- (a) It must be capable of direct assimilation.
- (b) It must be non-irritating.
- (c) It must be capable of easy sterilization.

There are few foods which meet these requirements. Most proteins are unsuitable for the reason that those of easy assimilation are difficult to sterilize without undergoing coagulation, and again, proteins which can be sterilized—peptones and albumoses—are not directly appropriated by the tissues and may even act as poisons to the tissues into which they are injected(59). Egg white in solution is quite difficult to prepare in sterile form, and, supposing it to be assimilated—which competent authorities deny—it is apt to exert a dangerous effect on the kidneys(60). Serum contains protein in a form that can be sterilized and is directly assimilable. When heated to 55° C. it becomes opalescent without coagulation, and can be administered subcutaneously without detriment(61). Reinach(62)

administered serum by the subcutaneous method to children who were very much exhausted by diarrhea, injecting 20 c.c. of ox serum under the skin at the sides of the thorax. This dosage contained only about $1\frac{1}{2}$ grams of protein, and it is possible that the injection of warm salt solution would have produced equally favorable results. Horse serum contains a much larger percentage of protein(63) and is more suitable in every way for subcutaneous administration. Salter(64) reports his experiences with horse serum, having administered as much as 100 to 120 c.c. without any ill effects. Carbohydrates in the form of grape sugar are easily sterilized and are quite readily assimilated. Voit(65) is in the habit of administering 60 grams of grape sugar in a 10 per cent solution without any ill effects or the production of glycosuria. The drawback to the subcutaneous administration of sugar solutions is the irritation and pain produced by the site of the injection. Leube(66) avers that not more than 15 or 20 grams of grape sugar can be injected without pain, while Barker(67) advises the injection of a 5 per cent solution in normal saline in conditions of exhaustion or collapse.

Mills found that fats which most nearly correspond to the body fats are more easily and readily absorbed and that emulsions are more rapidly absorbed than plain oils. His favorite emulsion was made with a 3-5 per cent of egg lecithin and sterile water. The area to be injected should always be sterilized with tincture of iodine, and after the injection slight massage is recommended. The physician should be very cautious to avoid entering a vein for fear of producing a pulmonary or fat embolism. If the nutrient emulsion is injected slowly into the subcutaneous tissue, as much as 60 grams may be administered without discomfort. In Mills' opinion, emulsified fats introduced subcutaneously are instantly burned, metabolized, and so act as spacers of body fat.

Of late the question as to how the individual nutrients are utilized in the metabolic processes of the body has aroused considerable interest. The carbohydrates are known to be distributed in the form of glucose, and thus are readily converted into energy. In the case of proteins, interest is centered on the amino-acids, which are known to be derived from them in the digestive changes in the alimentary canal. It has been established that fat is a source of considerable energy. Direct investigation of the metabolism in prolonged starvation has conclusively proven that the amount of protein destroyed is far too infinitesimal in such cases to account for the heat production.

The extent to which the ternary food elements are utilized in the production of energy is indicated by the respiratory quotient. This numerical

quantity is simply the ratio of the volume of carbon dioxide given out to that of the oxygen consumed. Carbohydrates, as, for example, those having the formula of $C_6H_{12}O_6$, may be looked upon as consisting of carbon plus water; so that if these were the only substances oxidized the oxygen would have been entirely used to combine with the carbon, and the respiratory quotient would be unity. In fats, however, there is some hydrogen besides carbon to be oxidized. Part of the oxygen taken up will be used for the oxidation of the hydrogen, so that here is less carbon dioxide given out than that equivalent to the oxygen taken in. The respiratory quotient of fats, therefore, is less than unity.

It has been known for some time, from studies of the respiratory quotient, that if the body has previously supplied the greater part of its needs at the expense of fats, it will do so during muscular work. Studies in this field have justified the belief that the tissues of the body are able to obtain their energy by direct utilization of the fats which they contain rather than by any devious path in which carbohydrate is first formed from the fat. Murlin and Riche(68) of the Cornell University Medical College have further clearly demonstrated that fat injected directly into the circulation can be oxidized at once. When, for example, an intravenous injection of a 3 per cent emulsion of lard oil was made in animals, the heat production was found to rise promptly, and the respiratory quotient fell as the fat became concentrated in the blood, thus indicating that the injected fat actually burns. These experimentally ascertained facts are not without interest in relation to the proposed use of fat emulsion for nutritive purposes by direct subcutaneous or other parenteral paths, without previous sojourn in the alimentary tract.

Caird has proven that emulsified oils are really assimilated and that the excretion of nitrogen is lessened by this method of introducing nutrients(69). It has been ascertained by post-mortem examination that fats have disappeared from the point of injection. If the oil be properly sterilized and careful aseptic technic observed, no local irritation will be produced, and the injections may be continued as long as four weeks without untoward results(70). Caird(71) reports a case of stricture of the esophagus which was being sustained by rectal alimentation, but the condition of the patient was growing more serious daily, when he commenced the subcutaneous administration into the gluteal region of 4 ounces of sterilized olive oil to the great benefit of the patient's general condition and without production of any local pain or irritation. While the subcutaneous administration of sterilized oil is a feasible proceeding, it must be remembered that it has a very limited value. Winternitz(72) reports that

fats so given are only very slowly absorbed and that not more than 25 calories can be supplied per day.

Recently Muggia(73) has reported his experiences with the subcutaneous administration of the yolk of egg in cases of malnutrition in infants as a substitute for lecithin. His method of preparation is as follows: "The yolk of a fresh egg is dropped into a sterilized vessel, a normal salt solution to the weight of one-third of the yolk is added, and the whole stirred with a sterilized glass rod." He uses 1 c.c. administered subcutaneously in the lumbar region which is previously sterilized with iodine solution. The injection is followed by a gentle massage. He advises that the quantity at each injection be gradually increased until it reaches 10 c.c. He does not consider it safe to go above this point.

The subcutaneous method of administering nutriment is not to be recommended except where the patient is unable to take food by mouth, rectum, or any other route, and while the method seems to present a field of usefulness, yet, in spite of the apparent favorable results reported by some observers, the use of fat for subcutaneous feeding must be pronounced a questionable procedure, as the method is not sufficiently perfected to suggest its application for general purposes.

GAVAGE

Gavage, or forced feeding (suralimentation), was first introduced by Debove in 1881(74). This method was first practiced in cases of obstinate vomiting by introducing food into the stomach by means of a tube. Strange to say, food so introduced is often retained when nourishment swallowed in the usual way is immediately ejected. At the present time, gavage covers all methods by which food is artificially introduced into the stomach by a tube in excess of the demands of appetite, and therefore may be more correctly termed "forced feeding." The tube may be passed through the mouth or, in hysterical or psychopathic patients who refuse food, it may be passed through the nose. This method of introducing alimentation into the stomach has been employed in stricture of the esophagus either spasmodic or organic, in conditions where there is paralysis of the muscles of deglutition and in coma. It must be borne in mind, however, that gavage is not unattended by danger, since the tube may enter the larynx, more especially if the patient is unconscious. Food should not be administered by this method oftener than once or twice daily except in patients who are conscious, then it may be given three or more times daily. The liquid foods are most suitable for gavage.

The aliment or "meal" should be made up according to the frequency with which it is to be repeated, and should be administered at about the body temperature, and introduced through a soft stomach tube, which should be anointed with melted butter or olive oil and gently introduced into the upper part of the esophagus. It need not be introduced into the stomach proper, unless there be stricture of the esophagus when it should be passed below the constriction. If the pharynx is oversensitive, it should be previously anesthetized by cocain solution.

The most suitable foods for this method of alimentation are milk, cream, eggs and sugars employed in the following or similar mixtures:

SUITABLE FOOD MIXTURES FOR GAVAGE

Milk.....	1 pint.....	500 c.c.....	350 calories
Cream.....	1 pint.....	500 c.c.....	1000 "
Lactose (cane-sugar).....	2 ounces.....	50 gm.....	200 "
Whole Milk.....	1 pint.....	500 c.c.....	350 "
Cream.....	½ pint.....	250 c.c.....	500 "
Eggs.....	2 whole.....	100 gm.....	160 "

Dujardin Beaumetz very highly recommends meat reduced to a powder, of which he gives from 100 to 400 grams daily stirred up in milk, chocolate or soup. A ration of three pints of milk to which have been added three ounces of milk sugar previously dissolved in water by bringing to the boiling point, with half a pint of milk and one pint of soup strengthened by some protein product, such as plasmon, or casein, will be amply sufficient to maintain nutrition of a patient who is at rest and confined in bed.

INUNCTIONS

Inunctions of various fatty substances have been practiced as a method of introducing fats into the system, and experiments have been conducted to determine whether such substances are really absorbed. The consensus of opinion seems to be that from 30 to 100 grams of fat or oil may be made to disappear in the skin when iodized or treated with other chemical tests. Fats and oils so treated have been recovered from the urine and saliva, which seems to carry conviction that fats and oils administered through the unbroken skin by this method are absorbed. It has not yet been definitely determined that fat itself thus introduced is utilized, but it seems altogether probable. Benedict(75) favors the use of oils at the melting point and those containing relatively more olein and palmitin and less

stearin. One of the most widely used fats for this purpose is cocoa-butter. It is very soft and contains palmitin, the only objection being a slight tendency to rancidity. Lard, tallow, olive oil and even cod-liver oil may be employed, though the last named is objectionable on account of its rancid odor. Lanolin and analogous preparations of sheep fat are well absorbed on account of their ready miscibility with water. While much is claimed for the inunction method, yet a sufficient full ration of fat cannot be administered. Unfortunately exact metabolism experiments to establish or disprove the dietetic value of this method of introducing fats are lacking.

FEEDING THROUGH FISTULÆ

When a gastric or intestinal fistula is made, the opening or wound is kept free by means of a tube for drainage and for feeding. A hard rubber or nickel-plated tube to prevent erosion by the gastric juice is preferable. The tube should be at least a third of an inch in diameter, and when not in use should be kept closed with a cork or cap. When the patient is to be fed, the prone position is preferable. The cork is removed and the tube washed with a syringe full of warm water. The first feeding should be a small quantity of liquid. Friedenwald and Ruhräh(76) advise a half cup of tea followed with milk and egg. The food should be gently poured into a glass funnel with tube attached which has been previously connected with the tube in the fistulous opening. If desirable, *lavage* may be similarly performed.

Any kind of food is allowable that the patient can digest. Even small pieces of chopped beef may be forced through the tube into the stomach. Bouillon, beef tea, soups, purées, eggs, creamed potatoes and minced breast of chicken may be gently pushed into the tube with a glass rod. After three weeks, the patient may be allowed to masticate his food, and by means of the feeding tube pass the masticated food into the stomach. When the fistula has been fitted with a proper hard rubber or nickel-plated tube with cork or cap to fit, the "spool" may be worn for a period of time without serious difficulty and with little inconvenience other than the necessary toilette peculiar to this process of feeding. During the past summer the author had under his charge two patients (one a Presbyterian minister), who, from malignant growths of the esophagus, were both compelled to have fistulous openings made in the stomach in order to be fed. They both, of course, for esthetic reasons, dined privately and while lying on their backs. At present they are following their usual professions and present every appearance of being full fed.

With the aid of Röntgenology it should not be difficult to make a correct diagnosis of stomach lesions. Therefore, a cancerous, dilated or degenerated catarrhal stomach should never be opened for surgical intervention. It is likewise an unpardonable error not to appreciate the rudimentary physiologic principles underlying the condition. Under such circumstances the intervals of feeding, the nature of the aliment, its preparation by predigestion, etc., the use of hydrochloric acid or other digestants such as pure scales of pepsin, require painstaking care and attention on the part of the physician. From a theoretical point of view, aliments introduced directly into the duodenum or jejunum ought to be prepared to imitate the action of normal gastric digestion by subjecting the "meal" to the action of pepsin and hydrochloric acid for an hour or two, but from practical experience this is not necessary. The aliment should, however, be warm—about 90° F.—and of a soft consistency, and it should be introduced more gradually than through gastric fistulæ.

In feeding through fistulæ, the appetite need not be considered, but, otherwise, more care should be exercised than when the food is ingested normally. Both for the comfort of the patient and to secure reflex stimulation of the digestive enzymes, some food should be taken in the mouth and, as previously stated, either "spit out" or pushed through the tube into the stomach. The general state of nutrition, the examination of the stools, and direct chemical tests of gastric or intestinal secretions aspirated through the fistula will determine any necessity for or against predigestion.

The following simple dietary has been recommended by Benedict(77):

BENEDICT'S DIETARY FOR FEEDING THROUGH FISTULÆ

	Protein		Fat		Carbohydrates		Calories
		gm.		gm.			
Milk, 1000 c.c.....	3.3%	33	4	40	4%	40	670
Wheat flour, in gruel,							
100 c.c.....	8	8	1.5%	1.5	75%	75	350
Meat juice, expressed,							
100 c.c.....	5	5	.....	.....	.....	.....	20
3 eggs.....	.....	25	.....	15	.....	.....	240
Glucose, 50 gr.....	.....	.....	.....	.....	50	.....	200
Bovine, 50 c.c.....	25	12.5	.....	.....	10%	5	70
							1550

This dietary is rather scant and may be variously modified by the addition of cereal gruels, purées, and more eggs and milk. Egg custards will add variety as well as calories. Apple sauce and fruit juices will be wel-

comed for their pleasing flavor and mineral content. In these emergency methods of feeding it will be found advisable, in order to maintain fair nutrition, (a) to see that the patient gets enough water, often by a different route than that through which the food is given; (b) to allow the patient fruit juices; (c) and to give a certain quantity of glucose, which may be given conveniently in a thick sirup of 80 per cent, yielding 3 calories per c.c.

SALINE IRRIGATIONS AND INFUSIONS

Rectal saline injections, already referred to in the section on rectal feeding, are especially useful in all conditions associated with hemorrhage; also in depleted conditions attending the various infectious diseases and in conditions where there is excessive and insatiable thirst where it is impracticable to give water by the mouth. The fluid used is preferably the normal saline solution and should be given "high" by means of an ordinary fountain syringe. The temperature of the solution should be about that of the body, and the outflow tube should be gauged so as to administer the solution very slowly with the patient in a prone position with the hips elevated. As much as one or two pints can be given at a time. A very convenient and practicable method of administering saline solutions or other fluids for this purpose is by the continuous proctoelysis method first suggested by Murphy and elaborated and improved upon by Kemp. The thermos bottle apparatus has already been described in the section on rectal feeding. This is the most desirable and convenient method to increase the amount of fluid in the system. It is of particular service in restoring cases that have lost quantities of blood. By this method the tissues are readily supplied with water, preventing further lymphatic absorption, more especially after operations on the thyroid and in major operations for amputation of the mammæ. The normal salt solution is preferable, but the formula advised by Murphy, consisting of sodium chlorid 1 dram, and calcium chlorid 1 dram, to a pint of water, may be used. If there is great prostration and weakness, whiskey or a strong infusion of coffee may be added to the saline solution. Lawson in 1908 suggested the use of plain water instead of salt solution. Trout has recently pointed out the advantages of plain water, averring that it is absorbed more rapidly and in larger quantities. It has been found that patients require nearly twice as much water by the mouth to relieve thirst after having salt solutions per rectum as those who are given plain water

by the rectal method. Often a patient, after having salt solution per rectum, will complain of tasting salt. This is not the case when plain water is used.

Saline infusions are given subcutaneously and are of value in cases where rectal saline irrigations, for one reason or another, cannot be utilized—for instance, in collapse from hemorrhage or from shock, and especially in the fulminating types of algid malarial infection. Saline infusions are especially useful where large quantities of fluids have been lost, as in the severe and exhaustive discharges in diarrheas, dysentery and cholera; likewise in infectious conditions and in intoxication accompanying pneumonia, erysipelas, typhoid fever and in the uremia complicating Bright's disease. The author has used the saline infusions in severe types of intoxication and prostration attending the algid types of malarial infections. The point of location for administering saline infusion is between the chest wall and the mammary gland, and in the deep muscular tissues over the lumbar region or in the gluteal region. The injection should be given under the strictest aseptic precautions. The apparatus can be rigged up in a few minutes by sterilizing a fountain syringe and attaching an aspirating needle to the end of the tube. The infusion should be about the temperature of the blood, and should be administered slowly. From 1 to 2 quarts may be injected at one sitting and in one place. The saline solution should be of normal strength, 0.6 per cent. Cushing(78) recommends the following:

Sodium chlorid.....	0.900
Calcium chlorid.....	0.026
Potassium chlorid.....	0.010
Distilled water.....	99.064
	<hr/>
	100.000

Friedenwald and Ruhrah(79) refer to a case of fatal sodium chlorid poisoning reported by Combs, where, by mistake, a liter of saturated salt solution was administered hypodermically. This solution contained 124.4 grams, 1,920 grains of sodium chlorid. Four hours after its administration the patient was comatose. This condition lasted for six hours, when a brief period of excitation followed. The patient was maniacal and talked incoherently, which lasted for 24 hours, at the end of which time death occurred.

REFERENCES

1. EWALD, C. A. Extrabuccal Feeding (critical review of this subject), N. Y. Med. Rec., Aug. 18, 1900.
2. GROS, A. P. Traitement de certaines maladies de l'estomac par la cure du repos absolu (sketch of the history of the subject—valuable monograph), Paris, 18989.
3. EICHHORST. Arch. f. Physiol., 1871, vol. iv, p. 570.
4. LEUBE. Leyden's Handbuch der Ernährungstherapie, p. 496, *et seq.*
5. BRANDENBURG. Deutsch Archiv. f. klin. Med., 1896, vol. lviii, p. 71.
6. HUBER. *Ibid.*, 1891, vol. xlvii, p. 495.
7. EWALD. Arch. f. Anat. u. Physiol., Suppl. Bd., 1899, p. 160.
8. PLANTENGA. (Abstract of dissertation) Cntrlbl. f. Physiol., 1899, No. 22, p. 734.
GROS. *Loc. cit.*
9. EHRLSTROM. Über den Nährwerth der Casein Klystiere, Zschr. f. klin. Med., 1903, vol. xlix, p. 377.
10. HOPPE. Münch. med. Wehnschr., 1904, No. 51.
11. VON LEUBE. *Ibid.*, 1902, No. 23.
12. THOMPSON, GILMAN. Practical Dietetics, pub. by D. Appleton & Co.
13. FLINT. N. Y. Med. Rec.
14. FRIEDENWALD and RUHRÄH. Diet in Health and Disease.
15. BOYD. Sutherland's System of Dietetics.
16. KEMP, ROBERT COLEMAN. Diseases of Stomach, Intestines and Pancreas.
17. REACH. Ueber Resorption von Kohlenhydraten von der Schleimhaut des Rektums, Zschr. f. diätet. u. physik Therap., 1903, vol. vii, p. 229.
18. BOYD. *Loc. cit.*
19. GRUTZNER. Pflüger's Archiv., 1898, Vol. lxxi, p. 492.
20. NENCKI, MACFAYDEN and SIEBER. Arch. f. exper. Path. u. Pharmacol., 1891, vol. xxvii, p. 311.
21. FLINT. Transactions, N. Y. Academy of Medicine.
22. DRUECK. Am. J. Clin. Med., 1916.
23. BROWN (of Washington). Food, vol. 4, No. 8.
24. GRUTZNER. Deutsch. med. Wehnschr., 1894, vol. xx, p. 897.
25. CANNON, W. B. The Mechanical Factors of Digestion, 1911.
26. GRUTZNER. Deutsch. med. Wehnschr., 1894.
27. ELLIOTT and BARCLAY-SMITH. J. Physiol., 1904, vol. xxxi, p. 272.
28. MAUCAIRE. Congr. de Chir., Paris, 1903, p. 86.

29. ADLER, HARRY. Value of Rectal Feeding, *Am. J. Med. Sci.*, 1915, p. 562.
30. SOPER. *J. Am. Med. Assn.*, Aug. 7, 1909.
31. EWALD. Diseases of the Stomach.
32. GRUNBAUM. *Brit. Med. J.*, 1900.
33. HALL, W. S. Nutrition and Dietetics, pub. by D. Appleton & Co.
34. HUBER. *Cntrlbl. f. d. ges. Therap.*, March, 1905.
35. KEMP, ROBERT COLEMAN. *Loc. cit.*, 2nd ed., p. 511.
36. ————. *N. Y. Med. J.*, Aug. 14, 1916.
37. ————. Diseases of Stomach, Intestines and Pancreas, 2nd ed.
38. PLANTENGA. *Cntrlbl. f. Physiol.*, 1899, No. 24, p. 735.
39. EDSALL and MILLER. *Bull. Univ. of Pa.*, 1903, vol. xv, p. 414.
40. BOYD. *Loc. cit.*
41. ————. *Scot. Med. & Surg. J.*, March, 1906.
42. VOIT. *Münch. med. Wehnschr.*, Aug. 4, 1896; 1897, No. 31.
43. PLANTENGA. *Cntrlbl. f. Physiol.*, 1899, No. 22, p. 734.
44. EINHORN, MAX. *N. Y. Med. Rec.*, July 16, 1910.
45. GROSS and HELD. *J. Am. Med. Assn.*, 1915, vol. lxxv, p. 520.
46. ROSENBLUM. *J. Am. Med. Sci.*, July, 1911.
47. EINHORN, MAX. *Post-Grad.*, June, 1913.
48. PAVLOV. *Savage Dissertation*, Petrograd, 1904, p. 6.
49. GROSS, M. H., and HELD, I. W. *J. Am. Med. Assn.*, 1915, vol. lxxv, p. 520.
50. EINHORN, MAX. *Am. J. Med. Sci.*, July, 1911; *Ibid.*, *Post-Grad.*, June, 1913, p. 5.
51. ———— and ROSENBLUM. *J. Am. Med. Sci.*, July, 1911.
52. GROSS and HELD. *J. Am. Med. Assn.*, 1915, vol. lxxv, p. 523.
53. HOLZKNECHT. *Münch. med. Wehnschr.*, Sept. 29, 1914.
54. LIPPMAN, C. W. Simplification of the Duodenal Tube Examination, *J. Am. Med. Assn.*, March 21, 1914, p. 911.
55. KEMP, ROBERT COLEMAN. *Enteroclysis, Hypodermoclysis*, pub. by James F. Dougherty, New York.
56. MENZEL and PERCO. For the history of subcutaneous feeding, *see* Bauer's *The Dietary of the Sick* (*Von Ziemssen's Handbook of General Therapy*, vol. i), p. 271, and Leube in *Leyden's Handbuch der Ernährungstherapie*, vol. i, 513.
57. VON LEUBE. *Sitzungsber. d. phys.-med. Gesellsch. zu Würzb.*, 1905.
58. MILLS. *Arch. Int. Med.*, vol. vii, p. 694.
59. NEUMEISTER. *Deutsch. med. Wehnschr.*, 1893, No. 36.

60. LEIGH. Nutritive Infusions, N. Y. Med. J., Aug. 30, 1902.
JACKSON. Subcutaneous Injections of White of Egg, *Ibid.*, Nov. 8, 1902.
LABORDE. De l'alimentation sous-cutanée par les matières albumi-
noïdes, J. de Physiol. et de Pathol., 1900, 2, p. 700.
61. FRIEDENTHAL and LEWANDOWSKY. Arch. f. Anat. u. Physiol.,
1899, Heft, 5, 6, p. 531.
62. REINACH. Berl. klin. Wchenschr., March 20, 1899.
63. SZONTAGH and WELLMAN. Deutsch. med. Wchenschr., 1898, No. 27.
64. SALTER. Guy's Hosp. Rep., 1896, Vol. liii, p. 241.
65. VOIT. Münch. med. Wchenschr., Aug. 4, 1896; No. 31, 1897.
66. VON LEUBE. Verhand. d. Cong. f. inn. Med., 1895, p. 418.
67. BARKER. Brit. Med. J., March 29, 1902.
68. MURLIN, J. R., and RICHE, J. A. Blood Fat in Relation to Heat
Production and Depth of Narcosis, Proc. Soc. Exper. Biol. &
Med., 1915, vol. xiii, p. 7.
69. CAIRD. Edinburgh Med. J., Sept., 1893.
70. JACOB. Quoted by Gumprecht, Verhand. d. Cong. f. inn. Med.,
1898, p. 124.
71. CAIRD. Edin. Med. J., Sept., 1893.
72. WINTERNITZ. Ztschr. f. klin. Med., 1903.
73. MUGGIA. Brit. Med. J., Sept. 30, 1899.
74. DEBOVE. Dujardin Beaumetz, Clinique Thérapeutique, 403.
75. BENEDICT, A. L. Golden Rules of Dietetics.
76. FRIEDENWALD and RUHRÄH. Diet in Health and Disease, pub. by
Saunders Co.
77. BENEDICT, A. L. *Loc. cit.*
78. CUSHING. Cohen's Physiologic Therapeutics, vol. ix, p. 289.
79. FRIEDENWALD and RUHRÄH. Diet in Health and Disease.

CHAPTER XXVII

DIETARIES FOR HOSPITALS AND ASYLUMS

GEO. N. KREIDER, A.M., M.D., F.A.C.S.

General Considerations.
Special Dietaries.

GENERAL CONSIDERATIONS

We deem it appropriate, having considered the subject of "Scientific Cookery" (Volume II, Chapter III), including the preparation of invalid foods and beverages, and special recipes for feeding in diabetes (Volume II, Chapter XVII), to incorporate in this volume an outline of the proper dietaries for hospitals and asylums, where numbers of persons are fed under the supervision of a steward. We make no attempt, however, to outline the diet suitable for each individual. We will consider diets from the general standpoint of all the inmates of the institution or hospital—acute or chronic cases, aged or infirm, invalids or healthy people of every sort. During the recent past, much thought and study have been given to the subject of institutional dietaries, with much advantage to the inmates where the results of such studies have been applied. In this line of investigation, however, much still remains to be done, for the public have not yet been sufficiently educated to grasp the importance of applying scientific methods in the commissary and culinary departments of institutions.

Hospitals and asylums of all sorts have of late years made an effort to find an easy and rational way to arrive at a satisfactory and intelligent use of food products. The needs of a patient laid up with a broken leg and of one convalescing from an acute or wasting infectious disease are quite different, yet many hospitals have only one standard of diet for all, no allowance being made for the different requirements of men and women, based on the caloric needs of the body according to weight.

An effort was made, when considering Protein and Nutrition (Vol-

ume II, Chapter VII), to point out the fact developed by Chittenden that physiologic economy in nutrition can be maintained on a low level of protein. Patients in general are used to much larger amounts than that advocated by Chittenden, and convalescents are in need of a certain extra quantity to make up the loss due to destructive catabolism from acute disease or prolonged illness—a fact which must be taken into consideration when outlining a dietary for a hospital patient. A convalescent diet should provide for a more liberal allowance of protein than the regular house diet. Again, a diabetic diet list should have a greater caloric value than the regular hospital dietary. Some of the daily dietaries outlined in this chapter contain in parallel columns the regular and convalescent diets. The variety of foods included is considerable, and should one desire to keep institutional expenses at a low level, this can easily be done by substituting the less expensive foods, adhering, however, to the same general plan.

Of course, it is readily observed why a convalescent diet should be of a higher nutritive value, more easily digestible, and contain more protein than the diet in health. A soft diet represents an intermediate step between fluid or milk diet and convalescent or regular diet, and need not be so strictly adhered to in point of food values, since a patient's appetite can be relied upon at this stage. The fluid diet contains a fair amount of protein, is of exceedingly low caloric value, and represents the aliment that may be allowed during the first day or two of any acute illness. The milk diet is of use for a time, particularly in an acute or occasionally in a chronic, renal affection. The principal objection is, that in order to provide for the caloric requirements, enormous quantities, from three to four quarts, are necessary, and this may put unnecessary strain upon the organs of excretion.

Special or extra articles of diet include all dietetic articles not on the regular and convalescent dietary for the day, and for which special written orders are given, usually by the physician, though in some instances by the head nurse. It is a regrettable fact that the commissary departments of many large hospitals are very poorly managed, owing to the fact that the steward is often inexperienced and frequently ignorant of the requirements of the individuals to be fed. We are glad to note that in some special hospitals dietitians of experience are selected who have had special instructions as to the correct preparation of the meals and the careful distribution of the food to the patients. But, as a rule, in public institutions errors in diet with their consequences are common, and the departments are frequently not economically conducted. A

well-equipped and well-conducted hospital should have a competent dietitian from the point of view of necessity and economy. The diet of the patient should be prescribed by the physician with as much care as the ordering of his medicines, and should be as carefully prepared and served as his prescription is compounded and dosage outlined. A trained dietitian, even in small hospitals, is a necessity. At the Passavant Memorial Hospital at Jacksonville, Illinois,¹ the dietitian is required to submit a monthly report showing the actual cost per capita. The daily per capita cost at this institution is twenty-two cents.

SPECIAL DIETARIES

DIETARIES, CHILDREN'S HOSPITAL OF BOSTON

HOUSE DIET: CHILDREN

Breakfast: Milk; cereals; eggs; bread and butter.

Dinner: Beef, mutton, or chicken (the last on holidays and sometimes on Sundays); mashed potatoes; boiled rice; gravy; bread or rice pudding, custard, or corn-starch; fruit; bread and butter; milk.

Supper: Bread and butter; milk; sometimes eggs.

Milk at 10 and at 4 o'clock, and when awake during the night, as required.

MILK DIET: Eight ounces of milk every two hours during day; every four hours during the night.

LIQUID DIET: Beef, mutton, or chicken broth, milk, beef juice, fruit juice.

SPECIAL DIET: Each item to be ordered by House Officer. Chicken, oysters, ice-cream, gelatin, soups, fruit, egg-nog, beef juice, milk, custard, milk toast.

All patients are to be put on milk diet unless otherwise ordered by House Officer.

Operative patients are to receive regular house diet until night before operation unless otherwise ordered.

"ETHER MEAL": Bouillon, seven ounces, four hours before operation.

OUT-PATIENT DEPARTMENT

DIRECTIONS FOR FEEDING THE BABY

Have a milkman leave the milk daily; do not get it at a store.

The mixed milk of a number of cows is better than one cow's milk.

Let the milk stand five hours in a cool place (if the cream has already risen, this is not necessary), and pour off the upper quarter from the can or bottle.

¹ G. N. Kreider, M.D.

Mix the food in the following proportions:

Top-milk.....	— ounces	} Quantities to be indicated by the physician
Water.....	— ounces	
Lime-water.....	— ounces	
Sugar-of-milk.....	— tablespoonsful	

Give — ounces at a feeding every — hours.

DIET LIST

Milk	Beef juice
Bread	Soft-boiled egg
Cracker	Boiled rice
Oatmeal	Macaroni
Oatmeal jelly	All the water the child wants.
Potatoes	No other food.

DIETARIES OF THE ROBERT GARRETT FREE HOSPITAL FOR CHILDREN, BALTIMORE, MD.¹

- Breakfast:* Rolled oats, well cooked, one tablespoonful with milk; bread, plain or toasted, one to three slices; butter, size of Malaga grape; egg, soft-boiled, one-half of one or one whole one; milk, slightly warmed, 8 to 12 ounces.
- Dinner:* Chicken, beef, or mutton, 1 tablespoonful cut fine; or broth (meat or oyster), 4 to 6 ounces; or meat stews with rice, 1 or 2 tablespoonfuls; baked potatoes or rice, 1 tablespoonful; bread, 1 or 2 slices; milk, 8 ounces; custard pudding, junket, 1 tablespoonful; or oranges or baked apples, one-half of one; stewed fruit or prunes, 1 tablespoonful; cake or ginger-bread, 1 inch to 1¼ inches square.
- Supper:* Bread, 2 or 3 slices; butter, size of small grape; or crackers, 4 or 5; milk, 8 to 16 ounces.

The foregoing is for a child three years old. For a boy of eight or for a girl of from ten to twelve years, twice this amount is allowed. A boy of twelve requires as much as an adult. Older children prefer cold milk or cocoa now and then. One quart of milk daily is allowed for each child. Variety does not appeal to children as to older persons.

HOUSE DIET

MONDAY

- Breakfast:* Rolled oats; eggs; toasted bread; hot milk.
Dinner: Chicken soup; rice; custard; bread and milk.
Supper: Bread and butter; crackers and milk.

TUESDAY

- Breakfast:* Rolled oats; bread and butter; cocoa; milk.
Dinner: Stew of beef; rice cakes or junket; bread and milk.
Supper: Bread and butter; crackers; milk.

WEDNESDAY

- Breakfast:* Rolled oats; eggs; toast; butter; hot milk.
Dinner: Steak or roast beef; rice; prunes; bread and milk.
Supper: Bread and butter; crackers; milk.

¹ Friedenwald and Ruhräh.

THURSDAY

Breakfast: Rolled oats; bread and butter; cocoa; milk.

Dinner: Soup or stew of mutton; rice; ginger-bread; bread and milk.

Supper: Bread and butter; crackers; milk.

FRIDAY

Breakfast: Rolled oats; toast; eggs; butter; hot milk.

Dinner: Oyster stew; rice; bread pudding; bread and milk.

Supper: Bread and butter; crackers; milk.

SATURDAY

Breakfast: Rolled oats; bread and butter; cocoa; milk.

Dinner: Lamb chops or roast beef; rice; baked apples; bread and milk.

Supper: Bread; butter; crackers; milk.

SUNDAY

Breakfast: Rolled oats; bread; butter; cocoa; milk (warm).

Dinner: Chicken; baked potatoes; oranges or stewed fruit; bread and milk.

Supper: Bread; butter; crackers and milk.

Light diet is house diet without meats.

Light diet allows bread, milk, rolled oats, soup, rice, junket, etc.

Milk diet consists of from four to six ounces of milk every two or three hours, according to the age and condition of the child.

Under one year, modified milk according to physician's prescription.

All water used in diluting milk is boiled first.

All drinking water is filtered in the city.

Spring water is used in the country.

DIETARIES, HOSPITAL FOR SICK CHILDREN, TORONTO

SUPERINTENDENT	MEDICAL STAFF
<p>MONDAY: Feb. 21, 1916</p> <p><i>Breakfast:</i> Grapefruit; poached eggs; toast; coffee; bread; butter.</p> <p><i>Lunch:</i> Creamed chicken; stuffed potatoes; celery; maple sirup; cornmeal muffins; bread; butter.</p> <p><i>Dinner:</i> Porterhouse steak; mashed potatoes; peas; cheese; salt wafers; apple cottage pudding; sauce; bread; butter.</p>	<p>Grapefruit; porridge; poached eggs; toast; coffee; bread; butter.</p> <p>Creamed chicken; stuffed potatoes; celery; maple sirup; cornmeal muffins; bread; butter.</p> <p>Porterhouse steak; mashed potatoes; peas; cheese; salt wafers; apple cottage pudding; sauce; bread; butter.</p>
<p>TUESDAY: Feb. 22</p> <p><i>Breakfast:</i> Grapefruit; boiled eggs; marmalade; toast; coffee; bread; butter.</p> <p><i>Lunch:</i> Fish; Duchess potatoes; stuffed celery; muffins; bread; butter.</p> <p><i>Dinner:</i> Consommé; veal cutlets; sweet potatoes; stewed celery; caramel ice-cream; bread; butter.</p>	<p>Grapefruit; porridge; boiled eggs; marmalade; toast; coffee; bread; butter.</p> <p>Fish; Duchess potatoes; stuffed celery; muffins; bread; butter.</p> <p>Consommé; veal cutlets; sweet potatoes; stewed celery; chocolate pudding; foaming orange sauce; bread; butter.</p>

DIETARIES, HOSPITAL FOR SICK CHILDREN, TORONTO—*Continued*

SUPERINTENDENT	MEDICAL STAFF
WEDNESDAY: Feb. 23	
<i>Breakfast:</i> Oranges; liver and bacon; marmalade; toast; coffee; bread; butter.	Oranges; porridge; liver and bacon; marmalade; toast; coffee; bread; butter.
<i>Lunch:</i> Macaroni and cheese; grapefruit and celery salad; jelly roll; bread; butter.	Macaroni and cheese; grapefruit and celery salad; jelly roll; bread; butter.
<i>Dinner:</i> Chicken stew with dumplings; potato and celery salad; rhubarb pie; bread; butter.	Chicken stew with dumplings; potato and celery salad; rhubarb pie; bread; butter.
THURSDAY: Feb. 24	
<i>Breakfast:</i> Grapefruit; poached eggs; toast; coffee; bread; butter.	Grapefruit; porridge; poached eggs; toast; coffee; bread; butter.
<i>Lunch:</i> Creamed chicken; stuffed potatoes; celery; maple sirup; cornmeal muffins; bread; butter.	Creamed chicken; stuffed potatoes; celery; maple sirup; cornmeal muffins; bread; butter.
<i>Dinner:</i> Porterhouse steak; mashed potatoes; peas; cheese; salt wafers; apple cottage pudding; sauce; bread; butter.	Porterhouse steak; mashed potatoes; peas; cheese; salt wafers; apple cottage pudding; sauce; bread; butter.
FRIDAY: Feb. 25	
<i>Breakfast:</i> Grapefruit; boiled eggs; marmalade; toast; coffee; bread; butter.	Grapefruit; porridge; boiled eggs; marmalade; toast; coffee; bread; butter.
<i>Lunch:</i> Fish; Duchess potatoes; stuffed celery; muffins; bread; butter.	Fish; Duchess potatoes; stuffed celery; muffins; bread; butter.
<i>Dinner:</i> Consommé; veal cutlets; sweet potatoes; stewed celery; caramel ice-cream; bread; butter.	Consommé; veal cutlets; sweet potatoes; stewed celery; chocolate pudding; foaming orange sauce; bread; butter.
SATURDAY: Feb. 26	
<i>Breakfast:</i> Oranges; liver and bacon; marmalade; toast; coffee; bread; butter.	Oranges; porridge; liver and bacon; marmalade; toast; coffee; bread; butter.
<i>Lunch:</i> Macaroni and cheese; grapefruit and celery salad; jelly roll; bread; butter.	Macaroni and cheese; grapefruit and celery salad; jelly roll; bread; butter.
<i>Dinner:</i> Chicken stew with dumplings; potato and celery salad; rhubarb pie; bread; butter.	Chicken stew with dumplings; potato and celery salad; rhubarb pie; bread; butter.
SUNDAY: Feb. 27	
<i>Breakfast:</i> Fried eggs and bacon; honey; toast; coffee; bread; butter.	Porridge; fried eggs and bacon; honey; toast; coffee; bread; butter.
<i>Lunch:</i> Cold meat; potato salad; fruit; chocolate layer cake; bread; butter.	Cold meat; potato salad; fruit; chocolate layer cake; bread; butter.
<i>Dinner:</i> Roast chicken; potatoes; green peas; corn fritters; orange charlotte; bread; butter.	Roast chicken; potatoes; green peas; corn fritters; orange charlotte; bread; butter.

DIETARIES, HOSPITAL FOR SICK CHILDREN, TORONTO—*Continued*

NURSES	CHILDREN
MONDAY: Feb. 21, 1916	
<i>Breakfast:</i> Porridge; fried eggs and bacon; jam; toast; coffee; bread; butter.	Porridge; bread and butter; milk.
<i>Dinner:</i> Dressed veal; sweet pickles; mashed potatoes; creamed carrots; prune soufflé; bread; butter.	Shepherd's pie; carrots; prune soufflé; bread; butter.
<i>Supper:</i> Cold meat; scalloped potatoes; sliced oranges; hot biscuits; bread; butter.	Apple sauce; bread and butter; milk.
TUESDAY: Feb. 22	
<i>Breakfast:</i> Oranges; porridge; scrambled eggs; toast; coffee; bread; butter.	Corn flakes; bread and butter; milk.
<i>Dinner:</i> Fish; sauce tartar; mashed potatoes; string beans; deep apple pie; bread; butter.	Fish; potatoes; tomatoes; chocolate blancmange; bread; butter.
<i>Supper:</i> Pork and beans; tomato sauce; celery; apple sauce; muffins; bread; butter.	Boiled eggs; bread and butter; milk.
WEDNESDAY: Feb. 23	
<i>Breakfast:</i> Porridge; bacon; jam; toast; coffee; bread; butter.	Corn flakes; bread and butter; milk.
<i>Dinner:</i> Roast beef; potatoes; onions; Spanish cream; red jelly; bread; butter.	Shepherd's pie; onions; baked rice; bread; butter.
<i>Supper:</i> Meat croquettes; baked potatoes; rhubarb; muffins; bread; butter.	Apple sauce; bread and butter; milk.
THURSDAY: Feb. 24	
<i>Breakfast:</i> Porridge; fried eggs and bacon; jam; toast; coffee; bread; butter.	Porridge; bread and butter; milk.
<i>Dinner:</i> Dressed veal; sweet pickles; mashed potatoes; creamed carrots; prune soufflé; bread; butter.	Shepherd's pie; carrots; prune soufflé; bread and butter.
<i>Supper:</i> Cold meat; scalloped potatoes; sliced oranges; hot biscuits; bread; butter.	Apple sauce; bread and butter; milk.
FRIDAY: Feb. 25	
<i>Breakfast:</i> Oranges; porridge; scrambled eggs; toast; coffee; bread; butter.	Corn flakes; bread and butter; milk.
<i>Dinner:</i> Fish; sauce tartar; mashed potatoes; string beans; deep apple pie; bread; butter.	Fish; potatoes; tomatoes; chocolate blancmange; bread; butter.
<i>Supper:</i> Pork and beans; tomato sauce; celery; apple sauce; muffins; bread; butter.	Boiled eggs; bread and butter; milk.

DIETARIES, HOSPITAL FOR SICK CHILDREN, TORONTO—*Continued*

NURSES	CHILDREN
SATURDAY: Feb. 26	
<i>Breakfast:</i> Porridge; bacon; jam; toast; coffee; bread; butter.	Corn flakes; bread and butter; milk.
<i>Dinner:</i> Roast beef; potatoes; onions; Spanish cream; red jelly; bread; butter.	Shepherd's pie; onions; baked rice; bread; butter.
<i>Supper:</i> Meat croquettes; baked potatoes; rhubarb; muffins; bread; butter.	Apple sauce; bread and butter; milk.
SUNDAY: Feb. 27	
<i>Breakfast:</i> Oranges; Force; bacon; toast; coffee; milk; bread; butter.	Boiled eggs; bread and butter; milk.
<i>Dinner:</i> Roast beef; Yorkshire pudding; potatoes; cauliflower; cream pie; tea; milk; bread; butter.	Jellied meat; potatoes; peas; baked chocolate custard; bread; butter.
<i>Supper:</i> Cold corned beef; cabbage salad; blackberries; cake; milk; tea; bread; butter.	Maple sirup; bread and butter; milk.

FLUID DIET	SOFT DIET
6 ounces every 2 hours of some one of the following: Milk Cocoa Broths Beef Tea Gruel Toast Water Albumin Water Rice Water Barley Water Kumiss This allows 2 pints milk in 24 hours.	Served 3 times a day: at 10.30 A.M., at 3.30 P.M., and at night if required Milk Cocoa Strained Soup Broths Beef Tea Gruel Milk Toast Boiled Rice Custard Junket Eggs, Soft-Boiled, Poached Egg-nog Jellies Cream This allows 2 pints milk in 24 hours.

DIETARIES, HOSPITAL FOR SICK CHILDREN, TORONTO—*Continued*

LIGHT DIET	GENERAL DIET
Served 3 times a day: at 10.30 A.M., at 3.30 P.M., and at night if required	3 meals a day
Milk	Milk
Cocoa	Cocoa
Bread, Toast	Bread, Toast
Butter	Butter
Porridge	Porridge
Strained Soup	Soups
Eggs	Meat, Poultry, Game
Fresh Fish	Fish, Fresh or Salt
Poultry or White Meat	Eggs
Custards, Creams	Vegetables, Salads
Jellies, Soda Biscuits	Puddings
Light Puddings	Cakes, Soda Biscuits
Preserved Fruit	Fruit, Fresh or Canned
Oranges, Grapes	
This allows $1\frac{1}{2}$ pints milk in 24 hours.	This allows $\frac{1}{2}$ pint milk in 24 hours.

MILK DIET

6 ounces milk every 2 hours or 3 pints in 24 hours

EXTRAS¹

Milk	Mutton Broth
Eggs	Beef Tea
Egg-nog	Beef Juice
Albumin Water	Scraped Beef
Cocoa	Beefsteak
Cream	Lamb Chops
Buttermilk	Broiled Chicken
Kumiss	Steamed Fish
Junket	Food Peptonized
Gruel	Wine Whey
Custards	Arrowroot
Jellies	Simple Drinks
Sweetbreads	Lemons
Oysters	Oranges
Oyster Broth	Grapes
Chicken Broth	

¹Formulae and Directions for making these various extras will be found in volume II, chapter XVII.

DIETARIES, GREAT ORMOND STREET HOSPITAL FOR SICK CHILDREN, LONDON

MILK DIET

- Breakfast*—8 A.M. Milk, one-half pint; bread, two ounces, with butter.
Dinner—12 M. Rice or other milk pudding; milk, one-third pint, or beef tea, one-half pint.
Tea—4 P.M. Milk, one-half pint, with two ounces of bread and butter.
Supper—6 P.M., or set aside for the night and early morning: Milk, one-half pint, with two ounces of bread and butter.

FISH DIET

- Breakfast*—8 A.M. Milk or cocoa, with sugar, one-half pint; bread, two and one-half ounces, with butter.
Dinner—12 M. Fish, one-half ounce, boiled; bread, one ounce; mashed potatoes, three ounces; rice or milk pudding.
Tea—4 P.M. Bread, two and one-half ounces with dripping; butter or treacle; milk, one-third pint.
Supper—6 P.M. or set aside for the night and early morning: Bread with butter or dripping; milk, one-third pint.

MEAT DIET

- Breakfast*—8 A.M. Milk or cocoa with sugar, one-half pint; bread, two and one-half ounces; mashed potatoes, four ounces; rice and milk pudding.
Dinner—12 M. Lamb chop, one-half ounce; bread one ounce; creamed potatoes; egg custard.
Tea—4 P.M. Bread, two and one-half ounces, with dripping, butter, or treacle; milk, one-third pint.
Supper—6 P.M., or set aside for the early night and morning: Bread, two ounces, with butter or dripping; milk, one-third pint.

Diet Ingredients.—Water or barley water may be mixed with the milk when used as a beverage, so long as the regulation quantity of milk is given in the twenty-four hours.

Greens, carrots, or turnips, etc., should be added twice a week to all fish and meat diets that include potatoes.

Tea, sponge-cake, fruit, water-cress, mutton chops, chicken, eggs, beef essence, wine, or brandy may be ordered as "extras" by the medical officers.

FANCY DIET

"Fancy diet" may be ordered in exceptional cases, the child being allowed whatever he can take—meat, fish, chicken, sausage, etc., with frequent variation.

All diets are adjusted for children of the age of seven years; apportionment is to be arranged in the wards according to the age and needs of the child.

**ACTUAL DAILY DIETARIES, WOMEN'S HOSPITAL,
NEW YORK CITY**

PRIVATE PATIENTS	STAFF AND NURSES
<p>MONDAY, April 24, 1916</p> <p><i>Breakfast:</i> Baked apples; oatmeal and cream; crisp bacon; rolls and butter; coffee with cream, tea or milk.</p> <p><i>Dinner:</i> St. Julien soup; steak; potato; string beans; baked custard; bread and butter; tea with cream, or milk.</p> <p><i>Supper:</i> Omelet; stuffed potato; fruit salad; fruit; cake; bread and butter; tea with cream, or milk.</p>	<p>Oranges; oatmeal with cream; eggs; rolls and butter; coffee with cream, tea or milk.</p> <p>Creamed pea soup; macaroni and cheese; cold meat; corn bread; bread and butter; tea, coffee, milk; fruit.</p> <p>Barley soup; steak; mashed potato; string beans; baked custard; bread and butter; tea with cream, coffee, or milk.</p>
<p>TUESDAY, April 25</p> <p><i>Breakfast:</i> Grapefruit; wheatina and cream; eggs; rolls; coffee; milk.</p> <p><i>Dinner:</i> Black bean soup; boiled tongue with sauce; potato; beets; prune whip; bread and butter; tea, coffee, or milk.</p> <p><i>Supper:</i> Creamed chicken on toast; baked potato; tomato salad, or tomato jelly salad; fruit; cake; bread; butter; tea, coffee, or milk.</p>	<p>Apple sauce; hominy; eggs and bacon; rolls; coffee and milk.</p> <p>Creamed tomato soup; eggs au gratin; boiled rice; Romaine and Russian dressing; fruit; bread and butter; tea, coffee, or milk.</p> <p>Rice soup; mutton chops; mashed potato; turnip; bread pudding; coffee, tea, or milk; bread and butter.</p>
<p>WEDNESDAY, April 26</p> <p><i>Breakfast:</i> Oranges; Pettijohn cream; eggs; rolls and butter; coffee with cream; tea or milk.</p> <p><i>Dinner:</i> Creole soup; chicken fricassee; potato; celery; olives; scalloped tomato; cornstarch pudding; bread and butter; tea or milk.</p> <p><i>Supper:</i> Eggs à la goldenrod; puffed potato; perfection salad; fruit; cake; tea or milk; bread and butter.</p>	<p>Prunes; cornmeal cream; eggs; rolls and butter; coffee with cream, tea, or milk.</p> <p>Lima bean soup; hash; vegetable salad; fruit; bread and butter; tea, coffee, or milk.</p> <p>Vegetable soup; roast veal; potato; onions; Bavarian cream; bread and butter; tea or milk.</p>
<p>THURSDAY, April 27</p> <p><i>Breakfast:</i> Grapefruit; oatmeal with cream; bacon; rolls and butter; coffee with cream, tea or milk.</p> <p><i>Dinner:</i> Vegetable soup; roast beef; roast potato; carrots and peas; bread pudding; bread and butter; tea, coffee, or milk.</p> <p><i>Supper:</i> Lamb's kidneys with bacon; baked potato; pear salad; fruit; ginger-bread; bread and butter; tea, coffee, or milk.</p>	<p>Apple sauce; oatmeal with cream; chipped beef; rolls and butter; coffee with cream, tea or milk.</p> <p>Lima bean soup; cream cheese on toast; hash; brown potato; apple sauce; ginger-bread; bread and butter; tea, coffee, or milk.</p> <p>Vegetable soup; boiled mutton with caper sauce; potato; peas; cottage pudding; bread and butter; coffee with cream, tea or milk.</p>

ACTUAL DAILY DIETARIES, WOMEN'S HOSPITAL,
NEW YORK CITY—*Continued*

PRIVATE PATIENTS	STAFF AND NURSES
FRIDAY, April 28	
<i>Breakfast:</i> Grapefruit; Ralston's cream; pan fish; rolls and butter; coffee with cream, tea, or milk.	Grapefruit; cornmeal with cream; pan fish; eggs; rolls and butter; coffee with cream, tea, or milk.
<i>Dinner:</i> Black bean soup; fish; potato; stuffed tomato; baked custard; bread and butter; tea or milk.	Spanish omelet; perfection salad; peaches; bread and butter; tea, coffee, or milk.
<i>Supper:</i> Broiled sardines; baked potato; stuffed celery salad; fruit; cake; bread and butter; tea or milk.	Split pea soup; fish; mashed potato; scalloped tomato; cocoanut custard; bread and butter; tea, coffee, or milk.
SATURDAY, April 29	
<i>Breakfast:</i> Baked apple; hominy cream; eggs; rolls and butter; coffee with cream, tea, or milk.	Oranges; hominy with cream; eggs; rolls and butter; coffee with cream.
<i>Dinner:</i> Creole soup; roast lamb; mashed potato; peas; Bavarian cream; bread and butter; tea or milk.	Creamed potato soup; Spanish omelet; green pepper salad; fruit; bread and butter; tea or milk.
<i>Supper:</i> Cold chicken, minced, on toast; stuffed potato; date and cheese salad; fruit; cake; bread and butter; tea or milk.	Vegetable soup; beef à la mode; mashed potato; onions; chocolate cornstarch with custard sauce.
SUNDAY, April 30	
<i>Breakfast:</i> Grapefruit; Pettijohn cream; eggs—omelet; rolls and butter; coffee with cream, tea, or milk.	Grapefruit; banana; cornmeal with cream; eggs; rolls and butter; coffee with cream, tea, or milk.
<i>Dinner:</i> Bouillon; broilers; chicken fricassee; mashed potato; celery—olives; new beets; ice cream; bread and butter; tea or milk.	Tomato soup; chicken fricassee; mashed potato; celery—olives; carrots; ice cream; bread and butter; tea, coffee, or milk.
<i>Supper:</i> Cold meat; baked potato; asparagus salad; fruit; cake; bread and butter; tea or milk.	Cold meat; hash brown potato; Waldorf salad; fruit; cake; bread; and butter; tea, coffee or milk.

DAILY DIETARIES, PRESBYTERIAN HOSPITAL, NEW YORK CITY¹

REGULAR HOUSE DIET	CONVALESCENT DIET
MONDAY	
<i>Breakfast:</i> Milk, coffee or tea with milk and sugar; bread and butter; hominy; bacon.	Milk, coffee or tea with milk and sugar; toast, rolls, or bread and butter; hominy; stew.
<i>Dinner:</i> Milk, 180 c.c. (6 oz.); bread and butter; vegetable soup; roast mutton; spinach or corn; mashed potatoes; rice pudding.	Milk; bread and butter; roast beef; mashed potato; rice pudding.
<i>Supper:</i> Tea or milk; bread and butter; eggs; apricots.	Tea or milk; toast, or bread and butter; egg; pears or apricots.
TUESDAY	
<i>Breakfast:</i> Milk, coffee or tea with milk and sugar; bread and butter; oatmeal; eggs.	Milk, coffee or tea with milk and sugar; toast, rolls, or bread and butter; oatmeal; 1 egg.
<i>Dinner:</i> Milk, 180 c.c. (6 oz.); bread and butter; lamb stew; boiled potatoes; beets; sago pudding.	Milk; bread and butter; fresh fish; boiled potato; hominy; ice cream.
<i>Supper:</i> Tea or milk; bread and butter; cereal with milk and sugar; apples.	Tea or milk; toast, or bread and butter; egg; apples (stewed).
WEDNESDAY	
<i>Breakfast:</i> Milk, coffee, or tea with milk and sugar; bread and butter; wheaten; fresh fish.	Milk, coffee, or tea with milk and sugar; toast, rolls, or bread and butter; wheaten; fresh fish.
<i>Dinner:</i> Milk, 180 c.c. (6 oz.); bread and butter; chicken; baked potatoes; boiled onions; baked apples.	Milk; bread and butter; chicken; baked potato; macaroni; tapioca pudding.
<i>Supper:</i> Tea or milk; bread and butter; cold meat; rhubarb or prunes.	Tea or milk; toast, or bread and butter; egg; rhubarb or prunes.
THURSDAY	
<i>Breakfast:</i> Milk, coffee, or tea with milk and sugar; bread and butter; hominy; eggs.	Milk, coffee, or tea with milk and sugar; toast, rolls, or bread and butter; hominy; 1 egg.
<i>Dinner:</i> Milk, 180 c.c. (6 oz.); bread and butter; pea soup; roast mutton; mashed potatoes; squash; bread pudding.	Milk; bread and butter; boiled beef; mashed potato; rice; baked custard.
<i>Supper:</i> Tea or milk; bread and butter; milk toast; baked apple.	Tea or milk; toast, or bread and butter; egg; baked apple.
FRIDAY	
<i>Breakfast:</i> Milk, coffee, or tea with milk and sugar; bread and butter; oatmeal; eggs.	Milk, coffee, or tea with milk and sugar; toast, rolls, or bread and butter; oatmeal; egg.
<i>Dinner:</i> Milk, 180 c.c. (6 oz.); bread and butter; fish; boiled potatoes; macaroni and tomatoes; rice pudding.	Milk; bread and butter; fresh fish; boiled potato; macaroni; ice cream.
<i>Supper:</i> Tea or milk; bread and butter; eggs; prunes.	Tea or milk; toast, or bread and butter; eggs; prunes.

¹ "Diet Lists" Presbyterian Hospital, New York City, by Herbert S. Carter, A.M., M.D. Pub. by W. B. Saunders Co., Phila., Pa.

DAILY DIETARIES, PRESBYTERIAN HOSPITAL, NEW YORK
CITY.—*Continued.*

REGULAR HOUSE DIET		CONVALESCENT DIET
SATURDAY		
<i>Breakfast:</i>	Milk, coffee or tea with milk and sugar; bread and butter; cornmeal; hash.	Milk, coffee, or tea with milk and sugar; toast, rolls, or bread and butter; cornmeal; stew.
<i>Dinner:</i>	Milk, 180 c.c. (6 oz.); bread and butter; vegetable soup; meat stew; mashed potatoes; spinach or corn; cornstarch pudding.	Milk; bread and butter; chicken; mashed potato; hominy; cornstarch pudding.
<i>Supper:</i>	Tea or milk; bread and butter; eggs; apricots or pears.	Tea or milk; toast, or bread and butter; egg; apricots or pears.
SUNDAY		
<i>Breakfast:</i>	Milk, coffee, or tea with milk and sugar; bread and butter; wheatena; eggs.	Milk, coffee, or tea with milk and sugar; toast, rolls, or bread and butter; wheatena; 1 egg.
<i>Dinner:</i>	Milk, 180 c.c. (6 oz.); bread and butter; chicken; tomatoes; baked potatoes; fresh fruit.	Milk; bread and butter; chicken; baked potato; orange.
<i>Supper:</i>	Tea or milk; bread and butter; cold meat; prunes.	Tea or milk; toast, or bread and butter; egg; prunes.

The *soft diet* in use at the Presbyterian Hospital is the same as the convalescent diet without meat, fish, and green vegetables.

The approximate caloric value of the regular *house diet* is as follows:

	Protein	Carbohydrate	Fat	Total Calories
Men.....	90 gm. (3 oz.)	300 gm. (10 oz.)	70 gm. (2½ oz.)	2,200
Women.....	80 " (2⅔ oz.)	250 " (8½ oz.)	60 " (2 oz.)	1,800

The approximate caloric value of the *convalescent dietary* is as follows:

	Protein	Carbohydrate	Fat	Total Calories
Men.....	100 gm. (3⅓ oz.)	300 gm. (10 oz.)	90 gm. (3 oz.)	2,500
Women.....	80 " (2⅔ oz.)	300 " (10 ")	80 " (2⅔ oz.)	2,200

The approximate caloric value of the *soft diet* is contained in the following table:

	Protein	Carbohydrate	Fat	Total Calories
Men.....	60 gm. (2 oz.)	350 gm. (11⅓ oz.)	60 gm. (2 oz.)	2,200
Women.....	50 " (1½ oz.)	300 " (10 oz.)	50 " (1½ oz.)	1,800

The regular house diet, convalescent diet, and soft diet are in use at the Presbyterian Hospital and are of particular use in arranging dietaries for institutional feeding. The variety of food as outlined in these dietaries is quite sufficient. The convalescent diet is of highly nutritive value, more easily digestible than the house diet, and contains more protein. The soft diet represents an intermediate energy value between a usual fluid or milk dietary and convalescent or regular diet.

DIET SHEET OF THE JOHNS HOPKINS HOSPITAL, BALTIMORE, MD.

Breakfast—8 A.M. Fruit; cereal (oatmeal, hominy, grits, wheaten); chops, steak, chicken (broiled), bacon, fish; potatoes; rolls.

Dinner—1 P.M. Soup; fish; beef (roast), lamb (roast), mint sauce, chicken (roast), turkey (roast), cranberry sauce, sweetbreads; salads (cress, lettuce); tomatoes, celery; potatoes, rice, vegetables; dessert; fruit.

Tea—6 P.M. Chicken, chops, steak, fish; potatoes; rolls; fruit.

DAILY ORDER FOR WARD

(To be filled in by Head Nurse)

Milk, quarts or gallons.....	Mutton-broth, pints.....
Eggs, dozen.....	Chicken soup, ".....
Butter, pounds.....	Beefsteak.....
Sugar, ".....	Chicken.....
Beef-tea, pints.....	Lemons, dozen.....

Number of patients on

Ward diet.....
Special diet.....
Light diet.....
Liquid diet.....

Total.....

.....Head Nurse.

WEEKLY ORDER

Special Orders for Monday, A.M.:

Tea.....
Coffee.....
Cocoa.....
Chocolate.....

DAILY DIETARIES, BELLEVUE HOSPITAL, NEW YORK CITY

MONDAY, April 24, 1916

Breakfast: Oatmeal; eggs; bread and butter; coffee; milk, and sugar.

Dinner: Bean soup; corned beef; cabbage; potatoes; bread and butter; tea; milk and sugar.

Supper: Macaroni; bread and butter; stewed apples; tea; milk and sugar.

TUESDAY, April 25

Breakfast: Hominy; eggs; bread and butter; coffee; milk and sugar.

Dinner: Mutton stew with vegetables and potatoes; bread and butter; bread pudding; tea; milk and sugar.

Supper: Potatoes; bread and butter; stewed apricots; tea; milk and sugar.

WEDNESDAY, April 26

Breakfast: Rice; bread; butter; coffee; milk and sugar.

Dinner: Barley soup; boiled beef; sauce; turnips; potatoes; bread; butter; tea; milk and sugar.

Supper: Pork and beans; bread; butter; stewed apples; tea; milk and sugar.

THURSDAY, April 27

Breakfast: Oatmeal; eggs; bread and butter; coffee; milk and sugar.

Dinner: Pea soup; boiled beef; sauce; cabbage; potatoes; bread and butter; tea; milk and sugar.

Supper: Rice; bread and butter; stewed prunes; tea; milk and sugar.

FRIDAY, April 28

Breakfast: Eggs; bread; butter; coffee; milk and sugar.

Dinner: Fish with cream sauce; potatoes; rice pudding; tea; milk and sugar.

Supper: Potatoes, bread and butter; stewed apricots; tea; milk and sugar.

SATURDAY, April 29

Breakfast: Hominy; bread; butter; coffee; milk and sugar.

Dinner: Pea soup; roast beef; gravy; macaroni; potatoes; bread and butter; tea; milk and sugar.

Supper: Pork and beans; bread; butter; stewed apricots; tea; milk and sugar.

SUNDAY, April 30

Breakfast: Eggs; bread and butter; coffee; milk and sugar.

Dinner: Rice soup; roast mutton; gravy; carrots; potatoes; bread and butter; cornstarch pudding; tea; milk and sugar.

Supper: Bread and butter; stewed prunes; tea; milk and sugar.

DAILY HOUSE DIETARY

MONDAY

Breakfast: Coffee (with milk and sugar); bread and butter; oatmeal; crackers; milk, 1 qt.

Dinner: Roast beef; rice; soup; potatoes; vegetables; bread.

Supper: Tea (with milk and sugar); bread and butter; stewed apples.

TUESDAY

Breakfast: Coffee (with milk and sugar); bread and butter; hominy; crackers; milk, 1 qt.

Dinner: Mutton stew; potatoes; vegetables; bread; bread pudding.

Supper: Tea (with milk and sugar); bread and butter; prunes.

WEDNESDAY

Breakfast: Coffee (with milk and sugar); bread and butter; rice; crackers; milk, 1 qt.

Dinner: Roast beef; barley soup; potatoes; bread.

Supper: Tea (with milk and sugar); bread and butter; stewed prunes.

THURSDAY

Breakfast: Coffee (with milk and sugar); bread and butter; oatmeal; crackers; milk, 1 qt.

Dinner: Beef stew; potatoes; vegetables; bread.

Supper: Tea (with milk and sugar); bread and butter; stewed apricots.

FRIDAY

Breakfast: Coffee (with milk and sugar); bread and butter; two eggs; crackers; milk, 1 qt.

Dinner: Baked fish; potatoes; vegetables; bread; rice pudding.

Supper: Tea (with milk and sugar); bread and butter; prunes.

SATURDAY

Breakfast: Coffee (with milk and sugar); bread and butter; hominy; crackers; milk, 1 qt.

Dinner: Mutton stew; potatoes; vegetables; bread.

Supper: Tea (with milk and sugar); bread and butter; stewed prunes; apples.

SUNDAY

Breakfast: Coffee (with milk and sugar); bread and butter; crackers; two eggs; milk, 1 qt.

Dinner: Corn beef; bean soup; potatoes; bread; cornstarch pudding.

Supper: Tea (with milk and sugar); bread and butter; prunes.

DIETARIES, BAY VIEW ASYLUM, BALTIMORE, MD.

REGULAR HOSPITAL	INSANE DEPARTMENT
MONDAY <i>Breakfast:</i> Oatmeal; bread; butter; eggs; milk; tea; coffee. <i>Dinner:</i> Beef soup; roast beef and gravy; bread; tea. <i>Supper:</i> Bread; butter; tea; coffee; milk.	Bread; coffee. Soup; beef; bread. Bread; coffee.
TUESDAY <i>Breakfast:</i> Oatmeal; bread; butter; eggs; milk; tea; coffee. <i>Dinner:</i> Beef soup; rice; milk; bread; butter; tea. <i>Supper:</i> Bread; butter; tea; coffee; milk.	Bread; coffee. Soup; beef; bread; rice. Bread; coffee; stewed fruit.
WEDNESDAY <i>Breakfast:</i> Oatmeal; bread; butter; milk; tea; coffee. <i>Dinner:</i> Chicken soup; beefsteak; apple sauce; bread; tea. <i>Supper:</i> Bread; butter; tea; coffee; milk.	Bread; coffee. Soup; hash; bread. Bread; coffee; stewed fruit.
THURSDAY <i>Breakfast:</i> Oatmeal; bread; butter; eggs; milk; tea; coffee. <i>Dinner:</i> Beef soup; roast beef and gravy; bread; tea. <i>Supper:</i> Bread; butter; tea; coffee; milk.	Bread; coffee; butter. Soup; beef; bread. Bread; coffee; cakes; cheese and crackers.
FRIDAY <i>Breakfast:</i> Bread; butter; mush and molasses; eggs; milk; tea; coffee. <i>Dinner:</i> Beef soup; rice; milk; bread; butter; tea. <i>Supper:</i> Bread; butter; tea; coffee; milk.	Bread; coffee; mush and molasses. Soup; mutton; bread. Bread; coffee; stewed fruit.
SATURDAY <i>Breakfast:</i> Oatmeal; bread; butter; eggs; milk; tea; coffee. <i>Dinner:</i> Beef soup; beefsteak; bread; tea; apple sauce. <i>Supper:</i> Bread; butter; tea; coffee; milk.	Bread; coffee. Soup; hash; bread. Bread; coffee; ginger-snaps; cheese.
SUNDAY <i>Breakfast:</i> Oatmeal; bread; butter; eggs; milk; tea; coffee. <i>Dinner:</i> Chicken soup; roast beef and gravy; bread; tea. <i>Supper:</i> Bread; butter; tea; coffee; stewed apples or prunes; milk.	Bread; coffee; sausage (in winter months). Bacon; soup; bread. Bread; coffee; molasses.

The lists given ¹ are reproduced not because they represent ideal dietaries, but merely to show the dietary provided by one of the best almshouses in this country. The inmates of this institution are well fed, well clothed, well housed, and in season the diet is varied by vegetables from the farms. In addition to the dietaries outlined, beef tea, lemonade and various other articles of diet are furnished on order of the physician by the diet kitchen. On Fridays, during the spring and summer, when the cost is not prohibitive, fish is allowed for dinner.

DAILY DIETARY, MARYLAND INSANE HOSPITAL¹

MONDAY

Breakfast: Beefsteak; grits; bread; sirup; coffee.

Dinner: Soup; greens; potatoes; hominy and bread.

Supper: Stewed prunes; bread; sirup; tea.

TUESDAY

Breakfast: Oatmeal; meat stew; bread; sirup; coffee.

Dinner: Salt meat; parsnips; greens; beans; bread.

Supper: Stewed apples; bread; sirup; butter; tea.

WEDNESDAY

Breakfast: Meat stew; potatoes; bread; sirup; coffee.

Dinner: Soup; beef; gravy; turnips; onions; bread.

Supper: Stewed prunes; bread; sirup; tea.

THURSDAY

Breakfast: Smoked sausage; grits; bread; sirup; coffee.

Dinner: Salt meat; potatoes; greens; hominy; bread.

Supper: Gingerbread; bread; sirup; butter; tea.

FRIDAY

Breakfast: Salt or fresh fish; potatoes; bread; sirup; coffee.

Dinner: Fresh fish; baked beans; turnips; parsnips; bread.

Supper: Hominy; cheese; crackers; bread; sirup; tea.

SATURDAY

Breakfast: Oatmeal; meat stew; bread; sirup; coffee.

Dinner: Soup; greens; potatoes; onions; bread.

Supper: Fried mush; bread; sirup; butter; tea.

SUNDAY

Breakfast: Steak; gravy; grits; bread; sirup; coffee.

Dinner: Beef; gravy; baked beans; parsnips; bread; dessert.

Supper: Roasted potatoes; cheese; crackers; ginger cakes; bread; sirup; tea.

¹ Friedenwald and Ruhräh.

**DIETARIES, U. S. GOVERNMENT HOSPITAL FOR INSANE,
WASHINGTON, D. C.**

PATIENTS ON SICK LIST	CONVALESCENT PATIENTS
<p>MONDAY <i>Breakfast:</i> Bread and butter with sirup; cereal; hash; toast; coffee with milk and sugar.</p> <p><i>Dinner:</i> Bread; corn soup; crackers; pot-roast beef; rice; parsnips; cherry ice cream; tea with milk and sugar.</p> <p><i>Supper:</i> Bread and butter with sirup; creamed salmon; toast; coffee with milk and sugar.</p>	<p>Bread and butter with sirup; rolled oats; steak; onions; potatoes; batter cakes; coffee with milk and sugar.</p> <p>Bread; potato soup; crackers; beef stew (baked); parsnips; potatoes; baked custard; tea with milk and sugar.</p> <p>Bread and butter with sirup; sausage cakes; scalloped potatoes; apple sauce; coffee with milk and sugar.</p>
<p>TUESDAY <i>Breakfast:</i> Bread and butter with sirup; oatmeal; beefsteak; baked potatoes; toast; coffee with milk and sugar.</p> <p><i>Dinner:</i> Bread; vegetable soup; crackers; potatoes; beef loaf; tomato sauce; junket with fruit; tea with milk and sugar.</p> <p><i>Supper:</i> Bread and butter with sirup; cream toast; apple sauce; coffee with milk and sugar.</p>	<p>Bread and butter with sirup; breakfast food; lamb chops; potatoes; muffins; coffee with milk and sugar.</p> <p>Bread and butter; tomato bisque; roast pork; apple sauce; boiled onions; potatoes; tapioca pudding; tea with milk and sugar.</p> <p>Bread and butter with sirup; cold tongue; French fried potatoes; evaporated peaches; doughnuts; coffee with milk and sugar.</p>
<p>WEDNESDAY <i>Breakfast:</i> Bread and butter with sirup; wheatlet; bacon; creamed potatoes; zwieback; coffee with milk and sugar.</p> <p><i>Dinner:</i> Bread and butter; oyster stew; fricasseed chicken; rice; browned parsnips; wine jelly; custard sauce; tea with milk and sugar.</p> <p><i>Supper:</i> Bread and butter with sirup; shredded wheat; sliced fruit; hot milk; coffee with milk and sugar.</p>	<p>Bread and butter with sirup; rolled oats; bacon; eggs; potatoes; corn bread; coffee with milk and sugar.</p> <p>Bread; vegetable soup; crackers; fish; beef (roast); turnips; potatoes; frozen custard; tea with milk and sugar.</p> <p>Bread and butter with sirup; beef croquettes; potato salad; cream puffs; coffee with milk and sugar.</p>
<p>THURSDAY <i>Breakfast:</i> Bread and butter with sirup; cereal; steak; potatoes; coffee with milk and sugar.</p> <p><i>Dinner:</i> Bread; potato soup; crackers; beef stew; rice; turnips; cottage pudding; tea with milk and sugar.</p> <p><i>Supper:</i> Bread and butter with sirup; egg; toast; coffee with milk and sugar.</p>	<p>Bread and butter with sirup; cornmeal mush; steak; potatoes; batter cakes; coffee with milk and sugar.</p> <p>Bread; vegetable soup; crackers; ham; kale; potatoes; chocolate blancmange; sauce; tea with milk and sugar.</p> <p>Bread and butter with sirup; sliced beef; potatoes; hot biscuits; coffee with milk and sugar.</p>

DIETARIES, U. S. GOVERNMENT HOSPITAL FOR INSANE
WASHINGTON, D. C.—*Continued*

PATIENTS ON SICK LIST	CONVALESCENT PATIENTS
FRIDAY	
<i>Breakfast:</i> Bread and butter with sirup; cereal; mackerel; creamed potatoes; rolls; coffee with milk and sugar.	Bread and butter with sirup; rolled oats; fresh fish; potatoes; muffins; coffee with milk and sugar.
<i>Dinner:</i> Bread; bean soup; crackers; veal stew; tomatoes; ice cream; tea with milk and sugar.	Bread and butter; tomato bisque; oyster pie; roast beef; corn; potatoes; floating island; tea with milk and sugar.
<i>Supper:</i> Bread and butter with sirup; raw oysters; apple sauce; coffee with milk and sugar.	Bread and butter with sirup; scrambled eggs; French fried potatoes; apple sauce; coffee with milk and sugar.
SATURDAY	
<i>Breakfast:</i> Bread and butter with sirup; cereal; eggs; potatoes; toast; coffee with milk and sugar.	Bread and butter with sirup; rolled oats; steak; potatoes; fried mush; coffee with milk and sugar.
<i>Dinner:</i> Bread and butter; oyster stew; roast veal; tomatoes; rice; custard; tea with milk and sugar.	Bread; clear soup; crackers; roast beef; macaroni; potatoes; lemon ice; tea with milk and sugar.
<i>Supper:</i> Bread and butter with sirup; broiled shad; toast; coffee with milk and sugar.	Bread and butter with sirup; fish croquettes; fried potatoes; evaporated peaches; coffee with milk and sugar.
SUNDAY	
<i>Breakfast:</i> Bread and butter with sirup; cereal; mackerel; creamed potatoes; toast; coffee with milk and sugar.	Bread and butter with sirup; wheatlet; ham; creamed potatoes; corn bread; coffee with milk and sugar.
<i>Dinner:</i> Bread and butter; tomato bisque; lamb stew; peas; bread pudding; tea with milk and sugar.	Bread; vegetable soup; crackers; fricasseed chicken; toast; tomatoes; potatoes; Spanish cream sauce; tea with milk and sugar.
<i>Supper:</i> Bread and butter with sirup; shredded wheat; sliced bananas; coffee with milk and sugar.	Bread and butter with sirup; cold ham; potato cakes; sauce; cake; coffee with milk and sugar.

The allowance of butter for each person is $\frac{1}{2}$ ounce at each meal except meals where soup is served.

The allowance of coffee is $\frac{1}{2}$ ounce per capita.

The usual allowance of milk and sugar is served with coffee and tea.

The allowance of tea is $\frac{1}{10}$ of an ounce per capita.

**DIETARIES, ST. ELIZABETH, U. S. GOVERNMENT HOSPITAL
FOR INSANE, WASHINGTON, D. C.**

PATIENTS ON SICK LIST	CONVALESCENT AND WORKING PATIENTS
MONDAY	
<i>Breakfast:</i> Bread and butter' with sirup; fresh sausage; fried hominy; rolls; coffee with milk and sugar.	Bread and butter with sirup; wheatlet; baked beans; rolls; fried ham; coffee with milk and sugar.
<i>Dinner:</i> Bread; boiled shoulder; pea soup; crackers; boiled rice; cabbage; coffee with milk and sugar.	Bread and butter; roast beef; bread dressing; tomatoes; potatoes; dessert; coffee with milk and sugar.
<i>Supper:</i> Bread and butter with sirup; apple jelly; rolls; tea with milk and sugar.	Bread and butter with sirup; evaporated fruit; cake; tea with milk and sugar.
TUESDAY	
<i>Breakfast:</i> Bread and butter with sirup; Pettijohn's food; liver and bacon; rolls; coffee with milk and sugar.	Bread and butter with sirup; smoked sausage; fried hominy; rolls; fried eggs; coffee with milk and sugar.
<i>Dinner:</i> Bread; vegetable soup; crackers; beef stew; lima beans; dessert; coffee with milk and sugar.	Bread; boiled shoulder; pea soup; crackers; boiled rice; cabbage; coffee with milk and sugar.
<i>Supper:</i> Bread and butter with sirup; evaporated fruit; cinnamon bread; tea with milk and sugar.	Bread and butter with sirup; apple jelly; rolls; dried beef; tea with milk and sugar.
WEDNESDAY	
<i>Breakfast:</i> Bread and butter with sirup; rolled oats; baked hash; rolls; coffee with milk and sugar.	Bread and butter with sirup; Pettijohn's food; liver and bacon; rolls; coffee with milk and sugar.
<i>Dinner:</i> Bread; bean soup; crackers; beef pot pie; cabbage; kidney beans; coffee with milk and sugar.	Bread; vegetable soup; crackers; beef stew; lima beans; dessert; roast mutton; coffee with milk and sugar.
<i>Supper:</i> Bread and butter with sirup; gingerbread; apple sauce; tea with milk and sugar.	Bread and butter with sirup; evaporated fruit; cinnamon bread; cold sliced shoulder; tea with milk and sugar.
THURSDAY	
<i>Breakfast:</i> Bread and butter with sirup; corn-meal mush; evaporated fruit; rolls; coffee with milk and sugar.	Bread and butter with sirup; rolled oats; baked hash; rolls; veal cutlets; coffee with milk and sugar.
<i>Dinner:</i> Bread; vegetable soup; crackers; beef pot pie; cabbage; kidney beans; coffee with milk and sugar.	Bread; bean soup; crackers; corned beef; macaroni; browned potatoes; coffee with milk and sugar.
<i>Supper:</i> Bread and butter with sirup; baked beans; biscuits; tea with milk and sugar.	Bread and butter with sirup; gingerbread; apple sauce; fish balls; tea with milk and sugar.

DIETARIES, ST. ELIZABETH, U. S. GOVERNMENT HOSPITAL FOR
INSANE, WASHINGTON, D. C.—*Continued.*

PATIENTS ON SICK LIST	CONVALESCENT AND WORKING PATIENTS
FRIDAY	
<i>Breakfast:</i> Bread and butter with sirup; mackerel or codfish; potatoes; rolls; coffee with milk and sugar.	Bread and butter with sirup; mackerel or codfish; potatoes; rolls; coffee with milk and sugar.
<i>Dinner:</i> Bread and butter; fresh fish; macaroni; boiled rice; pickles; apple or peach pie; coffee with milk and sugar.	Bread and butter; fresh fish; macaroni; boiled rice; pickles; apple or peach pie; coffee with milk and sugar.
<i>Supper:</i> Bread and butter with sirup; evaporated fruit; crackers; cheese; tea with milk and sugar.	Bread and butter with sirup; evaporated fruit; crackers; cheese; fried eggs; tea with milk and sugar.
SATURDAY	
<i>Breakfast:</i> Bread and butter with sirup; beefsteak; fried hominy; coffee with milk and sugar.	Bread and butter with sirup; beefsteak; fried hominy; coffee with milk and sugar.
<i>Dinner:</i> Bread; vegetable soup; crackers; boiled beef; boiled cabbage; potatoes; coffee with milk and sugar.	Bread; vegetable soup; crackers; boiled beef; boiled cabbage; potatoes; coffee with milk and sugar.
<i>Supper:</i> Bread and butter with sirup; evaporated fruit; ginger cakes; tea with milk and sugar.	Bread and butter with sirup; evaporated fruit; ginger cakes; breakfast bacon; tea with milk and sugar.
SUNDAY	
<i>Breakfast:</i> Bread and butter with sirup; wheatlet; baked beans; rolls; coffee with milk and sugar.	Bread and butter with sirup; cornmeal mush; evaporated fruit; rolls; mutton chops; coffee with milk and sugar.
<i>Dinner:</i> Bread and butter; roast beef; bread dressing; tomatoes; potatoes; dessert; coffee with milk and sugar.	Bread; vegetable soup; crackers; veal pot pie; cabbage; kidney beans; coffee with milk and sugar.
<i>Supper:</i> Bread and butter with sirup; evaporated fruit; cake; tea with milk and sugar.	Bread and butter with sirup; baked beans; biscuits; sliced corned beef; tea with milk and sugar.

The allowance of butter for each person is $\frac{1}{2}$ ounce at every meal except meals where soup is served.

The allowance of coffee is $\frac{1}{2}$ ounce per capita.

The usual allowance of milk and sugar is served with coffee and tea.

The allowance of tea is $\frac{1}{10}$ of an ounce per capita.

DAILY DIETARIES, LAKESIDE HOSPITAL, CLEVELAND, OHIO

DOCTORS	NURSES	HOUSE DIET
MONDAY		
<i>Breakfast:</i> Fruit, wheat gem and cream; baked beans; eggs; fish balls; brown bread; toast; coffee; milk.	Oatmeal and cream; broiled ham; potato; rolls; toast; coffee; cocoa.	Oatmeal and milk, creamed fish; potato; coffee; tea.
<i>Dinner:</i> Scalloped oysters; potato; cold meat; fruit salad; cake; tea; milk.	Cold meat; horseradish sauce; potato; banana fritters and maple sirup; tea; milk.	Soup; lamb stew; potato; creamed cabbage; baked date pudding; tea.
<i>Supper:</i> Roast-beef; Yorkshire pudding; potato; squash; celery; lettuce; Charlotte Russe; crackers and cheese; coffee; milk.	Soup; braised beef; potato; hot slaw; caramel ice-cream; cake; coffee.	Malt breakfast food; peach sauce; tea; cocoa.
TUESDAY		
<i>Breakfast:</i> Fruit; oatmeal and cream; broiled chops, eggs; potato; rolls; roast; coffee; milk.	Oatmeal and cream; creamed fresh fish; potato; rolls; toast; coffee; cocoa.	Oatmeal and milk; hash; coffee; tea.
<i>Dinner:</i> Soup; creamed chipped beef; baked potato; cold meat; fried mush and maple sirup; tea; milk.	Beef stew with dumplings; ginger bread and cheese; tea; milk.	Soup; roast beef; potato; squash; prune jelly; tea.
<i>Supper:</i> Soup; broiled steak; maître d'hôtel sauce; potato; asparagus tips on toast; olives; lettuce; mock cherry pie; crackers and cheese; coffee; milk.	Soup; roast beef; potato; stewed tomato; apple pie and cheese; coffee.	Corn starch, blanch-mange; apple sauce; tea; cocoa.
WEDNESDAY		
<i>Breakfast:</i> Fruit; oatmeal and cream; broiled fish; eggs; potato; rolls; toast; coffee; milk.	Wheat gems and cream; baked beans; fish balls; brown bread; toast; coffee; cocoa.	Wheat gems and milk; baked beans; brown bread; coffee; tea.
<i>Dinner:</i> Soup; mutton cutlets; brown sauce; potato; fruit jelly; whipped cream; tea; milk.	Scalloped oysters; potato; prune jelly; tea; milk.	Soup; roast beef; potato; squash; prune jelly; tea.
<i>Supper:</i> Soup; roast duck; jelly; potato; stewed tomatoes; olives; lettuce; strawberry ice-cream; crackers and cheese; cake; coffee; milk.	Soup; roast beef; potato; squash; steamed molasses pudding; nutmeg sauce; coffee.	Corn starch, blanch-mange; apple sauce; tea; cocoa.

DAILY DIETARIES, LAKESIDE HOSPITAL, CLEVELAND, O.—*Continued*

DOCTORS	NURSES	HOUSE DIET
THURSDAY		
<i>Breakfast:</i> Fruit; oatmeal and cream; broiled chops; eggs; potato; rolls; toast; coffee; milk.	Oatmeal and cream; creamed fresh fish; potato; rolls; toast; coffee; cocoa.	Oatmeal and milk; scrambled eggs; potato; coffee; tea.
<i>Dinner:</i> Soup; egg vermicelli on toast; potato; cold meat; boiled rice with cream and maple sirup; tea; milk.	Creamed chipped beef; potato; fried mush and maple sirup; tea; milk.	Soup; roast beef; potato; stewed tomato; dates; tea.
<i>Supper:</i> Soup; roast lamb; mint sauce; jelly; potato; string beans; lettuce; chocolate pudding; custard sauce; crackers and cheese; coffee; milk.	Soup; New England boiled dinner; apple pie and cheese; coffee.	Farina; peach sauce; tea; cocoa.
FRIDAY		
<i>Breakfast:</i> Fruit; wheat gem and cream; baked beans; eggs; fish balls; brown bread; toast; coffee; milk.	Oatmeal and cream; scrambled eggs and bacon; potato; rolls; toast; coffee; cocoa.	Oatmeal and milk; creamed salt fish; potato; coffee; tea.
<i>Dinner:</i> Oyster stew; lobster salad; potato; cold meat; fruit; jelly; cake; tea; milk.	Clam chowder, gingerbread and cheese; tea; milk.	Soup; baked fish; potato; baked macaroni; apple brown betty.
<i>Supper:</i> Soup; roast beef; potato; squash; olives; lettuce; Sultana ice-cream; crackers and cheese; cake; coffee; milk.	Soup; Finnan haddock; potato; macaroni and cheese; beet pickles; bisque ice-cream; cake; coffee.	Irish moss blanch-mange; prune sauce; tea; cocoa.
SATURDAY		
<i>Breakfast:</i> Fruit; oatmeal and cream; broiled chops; eggs; potato; rolls; toast; coffee; milk.	Oatmeal and cream; Hamburger steak; potato; rolls; toast; coffee; cocoa.	Oatmeal and milk; hash; coffee; tea.
<i>Dinner:</i> Soup; hash; cold meat; baked apples; cake; tea; milk.	Cold meat in tomato sauce; potato; bananas; tea; milk.	Soup; roast beef; potato; boiled beets; vanilla ice-cream; tea.
<i>Supper:</i> Soup; roast lamb; mint sauce; jelly; potato; spinach; lettuce; tapioca cream; crackers and cheese; coffee; milk.	Soup; roast beef; apple sauce; potato; green peas; New England pudding; coffee.	Hominy; peach sauce; tea; cocoa.

DAILY DIETARIES, LAKESIDE HOSPITAL, CLEVELAND, O.—*Continued*

DOCTORS	NURSES	HOUSE DIET
SUNDAY		
<i>Breakfast:</i> Fruit; oatmeal and cream; broiled steak; eggs; potato; rolls; toast; coffee; milk.	Oatmeal and cream; broiled fish; potato; rolls; toast; coffee; cocoa.	Wheat gems and milk; baked beans; brown bread; coffee; tea.
<i>Dinner:</i> Soup; cod à la mode; potato; cold meat; apple sauce; hot muffins; cocoa and whipped cream; tea; milk.	Cold meat; potato; baked apples; tea; milk.	Soup; roast beef; potato; squash; prune jelly; tea.
<i>Supper:</i> Soup; roast turkey; cranberry sauce; potato; mashed turnip; celery; lettuce; "snow-ball"; cream sauce; crackers and cheese; coffee; milk.	Soup; roast lamb; mint sauce; potato; boiled beets; tapioca cream; coffee.	Farina; apple sauce; tea; cocoa.

**ACTUAL DIETARIES, WALTER REED GENERAL HOSPITAL,
U. S. ARMY, WASHINGTON, D. C.**

OFFICERS	ENLISTED MEN	SEMI-LIQUID DIETARY
MONDAY, March. 6, 1916		
<i>Breakfast:</i> Oatmeal and milk; plain omelet; Lyonnaise potatoes; butter; sirup; bread; coffee; cream; sugar.	Oranges; oatmeal and cream; broiled ham; fried eggs; bread; butter; toast; coffee; cream; sugar.	Oatmeal and milk; soft boiled eggs; butter; toast; coffee; cream; sugar.
<i>Dinner:</i> Barley soup; roast beef; brown gravy; mashed potatoes; succotash; breaded tomatoes; tapioca pudding; bread; coffee; crackers; ketchup.	Cream of celery soup; roast rib of beef; mushroom sauce; browned potatoes; fried egg plant; boiled string beans; grapefruit salad; bread; butter; toast; cottage pudding; coffee; cream; sugar.	Cream of celery soup; boiled rice and milk; butter; toast; corn starch pudding; coffee; cream; sugar.
<i>Supper:</i> Chili con carne; boiled potatoes; boiled turnips with pork; cold slaw; corn bread; stewed peaches; butter; sirup; bread; coffee.	Oyster stew and crackers; cold meats; baked spaghetti and cheese; tomatoes; potato salad; bread; butter; toast; baked apples; coffee.	Oyster stew and crackers; butter; toast; stewed prunes; coffee.

ACTUAL DIETARIES, WALTER REED GENERAL HOSPITAL, U. S.
ARMY, WASHINGTON, D. C.—*Continued*

OFFICERS	ENLISTED MEN	SEMI-LIQUID DIETARY
TUESDAY, March 7		
<i>Breakfast:</i> Oranges; cream of wheat and cream; soft boiled eggs; fried breakfast bacon; bread; butter; toast; coffee; cream; sugar.	Cream of wheat and milk; ham omelet; hot rolls; stewed prunes; butter; sirup; bread; coffee.	Cream of wheat and milk; soft boiled eggs; butter; toast; coffee; cream; sugar.
<i>Dinner:</i> Vegetable soup; boiled leg of lamb with caper sauce; boiled potatoes; boiled spinach with egg; stewed peas; egg salad; bread; butter; toast; pumpkin pie; coffee; cream; sugar.	Noodle soup; boiled corned beef; boiled potatoes; boiled cabbage; pickles; baked bean salad; pumpkin pie; butter; ketchup; bread; coffee.	Vegetable soup; boiled rice and milk; butter; toast; tapioca pudding; coffee; cream; sugar.
<i>Supper:</i> Broiled porterhouse steak; French fried potatoes; creamed cauliflower; buttered beets; hot biscuits; bread; butter; strawberries and cream; coffee; cream; sugar.	Baked beef hash; creamed carrots and peas; breaded tomatoes; hot biscuits; stewed fruit; butter; bread; ketchup; coffee; cream; sugar.	Corn-meal mush and milk; butter; toast; apple sauce; coffee; cream; sugar.
WEDNESDAY, March 8		
<i>Breakfast:</i> Grapefruit; corn flakes and cream; poached eggs on toast; fried breakfast bacon; bread; butter; toast; coffee; cream; sugar.	Corn flakes and milk; creamed chipped beef on toast; hashed brown potatoes; butter; sirup; bread; coffee.	Corn flakes and milk; soft boiled eggs; butter; toast; coffee; cream; sugar.
<i>Dinner:</i> Noodle soup; roast veal; brown gravy; mashed potatoes; boiled string beans; creamed cabbage; tomato and lettuce salad; vanilla ice cream; bread; butter; cake; coffee.	Split pea soup; beef loaf; brown gravy; boiled sweet potatoes; boiled string beans; boiled onions; buttered rice; bread; coffee; crackers.	Noodle soup; boiled rice and milk; butter; toast; vanilla ice cream; coffee; cream; sugar.
<i>Supper:</i> Cold sliced ham; pan-fried oysters on toast; baked potatoes; creamed asparagus; bread; butter; stewed rhubarb; ginger cakes; coffee.	Braised beef; French fried potatoes; creamed corn; boiled beets; stewed peaches; bread; coffee.	Milk toast; butter; toast; baked custard; coffee; cream; sugar.

ACTUAL DIETARIES, WALTER REED GENERAL HOSPITAL, U. S.
ARMY, WASHINGTON, D. C.—*Continued*

OFFICERS	ENLISTED MEN	SEMI-LIQUID DIETARY
THURSDAY, March 9		
<i>Breakfast:</i> Oranges; oatmeal and cream; soft boiled eggs; fried breakfast bacon; bread; butter; toast; coffee.	Cream of wheat and milk; fried sausage; lyonnaise potatoes; Parkerhouse rolls; butter; sirup; bread; coffee.	Oatmeal and milk; soft boiled eggs; butter; toast; coffee or cocoa.
<i>Dinner:</i> Barley soup; chicken fricassee with dumplings; boiled potatoes with parsley; stewed peas; boiled kale; fruit salad; bread; butter; toast; dried apple pie; coffee, cream, sugar.	Vegetable soup; roast veal; bread dressing; brown gravy; mashed potatoes; stewed peas; buttered beets; dried apple pie; bread; coffee; crackers.	Barley soup; boiled rice and milk; butter; toast; corn starch pudding; coffee, cream, sugar.
<i>Supper:</i> Breaded veal cutlets with tomato sauce; baked potatoes; mashed summer squash; boiled string beans; bread, butter, toast; sliced pineapple; coffee or tea.	Cold meats; baked macaroni and cheese; baked potatoes; stewed tomatoes; butter; sirup; bread; coffee.	Scrambled eggs; butter; toast; stewed prunes; coffee or tea.
FRIDAY, March 10		
<i>Breakfast:</i> Bananas; corn flakes and cream; scrambled eggs; fried pork sausage; hot cakes; maple sirup; bread; butter; coffee.	Oatmeal and milk; soft boiled eggs; lyonnaise potatoes; butter; sirup; bread; coffee.	Grapenuts and cream; soft boiled eggs; butter; toast; coffee or cocoa.
<i>Dinner:</i> Vegetable soup; baked shad roe; mashed potatoes; succotash; stewed tomatoes; pickles; combination salad; bread; butter; toast; strawberry short cake; coffee.	Spaghetti soup; baked fresh fish; mashed potatoes; cream gravy; succotash; creamed cabbage; pickles; celery; tapioca pudding; bread; coffee; crackers; ketchup.	Vegetable soup; boiled rice and milk; butter; toast; tapioca pudding; coffee, cream, sugar.
<i>Supper:</i> Chili con carne; boiled potatoes; stewed peas; cauliflower au gratin; hot biscuits; bread; butter; baked apples; cream cheese; coffee or tea.	Beef pot-pie; boiled kale; boiled beets; breaded tomatoes; stewed prunes; bread; coffee.	Cream of wheat and milk; butter; toast; strawberry jello; coffee or tea.

ACTUAL DIETARIES, WALTER REED GENERAL HOSPITAL, U. S.
ARMY, WASHINGTON, D. C.—*Continued*

OFFICERS	ENLISTED MEN	SEMI-LIQUID DIETARY
SATURDAY, March 11		
<i>Breakfast:</i> Grapefruit; cream of wheat; soft boiled eggs; fried breakfast bacon; bread; butter; toast; coffee.	Cream of wheat and milk; scrambled eggs; hashed brown potatoes; butter; sirup; bread; coffee; hot rolls.	Cream of wheat and milk; poached eggs on toast; butter; toast; coffee or cocoa.
<i>Dinner:</i> Noodle soup; roast loin of pork, brown gravy; browned potatoes; boiled string beans; buttered beets; apple sauce; tomato salad; bread; butter; toast; pumpkin pie; coffee.	Purée of tomato soup; baked beans with pork; piccalilli salad; creamed onions; corn bread; pumpkin pie; butter; bread; coffee; crackers; ketchup.	Noodle soup; boiled rice and milk; butter; toast; bread pudding; coffee, cream, sugar.
<i>Supper:</i> Broiled lamb chops; hashed brown potatoes; creamed asparagus on toast; bread; butter; toast; stewed peaches; coffee; or tea.	Tomato omelet; hashed brown potatoes; creamed carrots and peas; buttered rice; hot biscuits; butter; sirup; bread; coffee.	Scrambled eggs; butter; toast; stewed peaches; coffee or tea.
SUNDAY, March 12		
<i>Breakfast:</i> Bananas; corn flakes and cream; soft boiled eggs; fried breakfast bacon; bread; butter; toast; coffee; cream; sugar.	Cream of wheat and milk; pork sausage; hashed brown potatoes; butter; sirup; bread; coffee; cream; sugar.	Corn flakes and milk; soft boiled eggs; butter; toast; coffee; cream; sugar.
<i>Dinner:</i> Spaghetti soup; roast duck with dressing; mashed potatoes; asparagus with butter; stewed corn; green apple sauce; celery; fruit salad; chocolate ice cream; cakes; coffee.	Purée of tomato soup; roast loin of pork; brown gravy; braised sweet potatoes; stewed peas; green apple sauce; celery; ice cream; bread; coffee; crackers.	Spaghetti soup; boiled rice and milk; butter; toast; ice cream; coffee; cream; sugar.
<i>Supper:</i> Broiled lamb chops; French fried potatoes; stewed peas; boiled onions; bread; butter; toast; stewed peaches; coffee; cream, sugar.	Cold meat; potato salad; baked macaroni and cheese; pickles; jelly; butter; toast; stewed prunes; coffee; cream, sugar.	Cream of wheat and milk; butter; toast; stewed prunes; coffee, cream, sugar.

**ORDINARY DIETARY, HOSPITALS,
U. S. PUBLIC HEALTH SERVICE**

MONDAY

- Breakfast:* Coffee, 1 pint; bread, 6 ounces; butter $\frac{1}{2}$ of an ounce; meat hash with vegetables, 6 ounces; stewed fruit, 3 ounces.
- Dinner:* Vegetable soup, 1 pint; beef (boiled), 6 ounces; potatoes, 8 ounces; pudding with sauce, 4 ounces; bread, 4 ounces.
- Supper:* Tea, 1 pint; bread, 6 ounces; butter, $\frac{1}{2}$ of an ounce; fruit sauce, 3 ounces.

TUESDAY

- Breakfast:* Coffee, 1 pint; bread, 6 ounces; butter, $\frac{1}{2}$ of an ounce; corned-beef hash with potatoes, 6 ounces.
- Dinner:* Beef soup, 1 pint; beef (boiled), 6 ounces; fish, fresh, 6 ounces; vegetables, 8 ounces; bread, 4 ounces; fruit, 4 ounces.
- Supper:* Tea, 1 pint; bread, 6 ounces; butter $\frac{1}{2}$ of an ounce; fruit (stewed), 4 ounces. Fresh fruit may be substituted in season.

WEDNESDAY

- Breakfast:* Coffee, 1 pint; bread, 4 ounces; butter, 2 ounces; fish hash with vegetables, 6 ounces.
- Dinner:* Mutton broth, 1 pint; mutton (boiled), 6 ounces; potatoes, 8 ounces; rice pudding with sauce, 4 ounces; bread, 4 ounces.
- Supper:* Tea, 1 pint; bread, 6 ounces; butter, $\frac{1}{2}$ of an ounce; cooked fruit, 4 ounces.

THURSDAY

- Breakfast:* Coffee, 1 pint; bread, 6 ounces; butter, $\frac{3}{4}$ of an ounce; meat stew, 6 ounces.
- Dinner:* Soup (bouillon), 1 pint; roast beef, 6 ounces; potatoes, 8 ounces; bread, 4 ounces; fruit, 4 ounces.
- Supper:* Tea, 1 pint; bread, 4 ounces; butter, $\frac{1}{2}$ ounce; fruit pudding, 4 ounces.

FRIDAY

- Breakfast:* Coffee, 1 pint; bread, 6 ounces; butter, $\frac{1}{2}$ of an ounce; fish hash with vegetables, 6 ounces.
- Dinner:* Vegetable soup, 1 pint; meat stew, 8 ounces; fish, 6 ounces; bread, 4 ounces; vegetables, 8 ounces; fruit, 4 ounces.
- Supper:* Tea, 1 pint; bread, 4 ounces; butter, $\frac{3}{4}$ of an ounce; cold meat, 4 ounces.

SATURDAY

- Breakfast:* Coffee, 1 pint; bread, 6 ounces; butter, $\frac{1}{2}$ of an ounce; mutton chop, 6 ounces; fried potatoes, 3 ounces.
- Dinner:* Barley soup, 1 pint; mutton (boiled), 8 ounces; bread, 4 ounces; vegetables, 10 ounces.
- Supper:* Tea, 1 pint; bread, 4 ounces; butter, $\frac{3}{4}$ of an ounce; rice, with sauce or sirup, 4 ounces.

SUNDAY

Breakfast: Chocolate, 1 pint; bread, 6 ounces; butter, $\frac{1}{2}$ of an ounce; meat stew, 4 ounces; fruit sauce, 3 ounces.

Dinner: Soup, 1 pint; roast beef, 6 ounces; potatoes, 8 ounces; other vegetables, 4 ounces; rice or tapioca pudding, 4 ounces.

Supper: Tea, 1 pint; bread, 6 ounces; butter, $\frac{3}{4}$ of an ounce; mush and milk, 12 ounces.

The tea and coffee prepared with milk and sugar.

The above table is observed as a guide at all stations of the United States Public Health Service with modifications controlled by climate, season and the local market.

The quantities of the articles of diet indicate them as they are prepared ready to serve.

The above table is designed to provide 120 to 140 grams of proteins, 70 to 80 grams of fat and 450 to 550 grams of carbohydrates, and to yield from 3,100 to 3,600 calories per day.

Although these quantities are somewhat in excess of the estimates for "healthy adults at rest," they are none too great for convalescents, in whom tissue metamorphosis is being carried on; not only in the interest of repair of present waste from use, but in the interest of repair of past waste from disease, a point which should not be overlooked in the construction of hospital dietaries. In making any change from the above, the substituted articles should be in such quantities and of such kinds as to furnish constituents equivalent to those of the articles replaced.

FULL DIET TABLE, NAVY HOSPITALS

MONDAY

Breakfast: Coffee, 1 ounce; bread, 4 ounces; butter, 1 ounce; milk, 2 ounces; sugar, $\frac{3}{4}$ of an ounce; cornmeal (bread or mush), $2\frac{1}{2}$ ounces; ham and eggs (2) or potatoes, 4 ounces; sausage, 3 ounces.

Dinner: Sago soup, 8 ounces; bread, 4 ounces; roast mutton or lamb or boiled ham, 8 ounces; potatoes, 8 ounces; other vegetables, 6 ounces; pickles, 1 ounce; pie, 6 ounces.

Supper: Tea, $\frac{1}{4}$ of an ounce; bread, 6 ounces; butter, 1 ounce; milk, 2 ounces; sugar, 1 ounce; cold roast beef or beef stew or hash, 8 ounces; cheese, 2 ounces; baked fresh fruit or apple sauce or stewed dried fruit, 4 ounces.

Full Diet Table, Navy Hospitals—Continued

TUESDAY

- Breakfast:* Coffee, 1 ounce; bread, 4 ounces; butter, 1 ounce; milk, 2 ounces; sugar, $\frac{3}{4}$ of an ounce; pork, 1 ounce, and beans, 4 ounces, or beef stew or hash, 8 ounces, or mutton stew, 8 ounces.
- Dinner:* Vegetable soup, 8 ounces; bread, 4 ounces; boiled corned beef or roast beef, 8 ounces; potatoes, 8 ounces; other vegetables, 6 ounces; pickles, 1 ounce; boiled or baked dumplings with sauce, 6 ounces.
- Supper:* Tea, $\frac{1}{4}$ of an ounce; bread, 6 ounces; butter, 1 ounce; milk, 2 ounces; sugar, 1 ounce; cold roast mutton or lamb or cold ham, 4 ounces; apple sauce or baked fresh fruit or stewed dried fruit, 4 ounces.

WEDNESDAY

- Breakfast:* Coffee, 1 ounce; bread, 4 ounces; butter, 1 ounce; milk, 6 ounces; sugar, $\frac{3}{4}$ of an ounce; oatmeal, 1 ounce; mutton or lamb chops, 6 ounces, or liver, 4 ounces, and bacon, $\frac{1}{2}$ an ounce.
- Dinner:* Macaroni soup, 8 ounces; bread, 4 ounces; roast veal or roast or boiled fowl, 8 ounces; potatoes, 8 ounces; other vegetables, 6 ounces; pickles, 1 ounce; tapioca pudding with sauce, 6 ounces.
- Supper:* Tea, $\frac{1}{4}$ of an ounce; bread, 6 ounces; butter, 1 ounce; milk, 2 ounces; sugar, 1 ounce; corned beef hash, 8 ounces, or cold roast beef, 4 ounces; stewed dried fruit or baked fresh fruit or apple sauce, 4 ounces.

THURSDAY

- Breakfast:* Coffee, 1 ounce; bread, 4 ounces; butter, 1 ounce; milk, 2 ounces; sugar, $\frac{3}{4}$ of an ounce; beefsteak, 6 ounces; milk, 4 ounces; oatmeal, 1 ounce, or potatoes, 4 ounces.
- Dinner:* Vermicelli soup, 8 ounces; bread, 4 ounces; roast beef, 8 ounces, and potatoes, 8 ounces, or pork, 3 ounces, and beans, 4 ounces; other vegetables, 6 ounces; pickles, 1 ounce; cornstarch pudding with sauce, 6 ounces.
- Supper:* Tea, $\frac{1}{4}$ of an ounce; bread, 6 ounces; butter, 1 ounce; milk, 2 ounces; sugar, 1 ounce; cold veal stew or beef stew or hash, 8 ounces; baked fresh fruit or stewed dried fruit or apple sauce, 4 ounces.

FRIDAY

- Breakfast:* Coffee, 1 ounce; bread, 4 ounces; butter, 1 ounce; milk, 2 ounces; sugar, $\frac{3}{4}$ of an ounce; sugar, milk, 4 ounces; oatmeal, 1 ounce; mackerel, 4 ounces, or hominy, 2 ounces; codfish, 4 ounces.
- Dinner:* Bean soup, 8 ounces; bread, 4 ounces; fish, fresh, 10 ounces, or fish, salt, 8 ounces; potatoes, 8 ounces; other vegetables, 6 ounces; pickles, 1 ounce; pie, 6 ounces.
- Supper:* Tea, $\frac{1}{4}$ of an ounce; bread, 6 ounces; butter, 1 ounce; milk, 2 ounces; sugar, 1 ounce; macaroni, 2 ounces, and cheese, 1 ounce, or cold roast beef, 4 ounces, or beef stew or hash, 8 ounces. Stewed dried fruit or apple sauce or baked fresh fruit, 4 ounces.

*Full Diet Table, Navy Hospitals—Continued***SATURDAY**

Breakfast: Coffee, 1 ounce; bread, 4 ounces; butter, 1 ounce; milk, 2 ounces; sugar, $\frac{3}{4}$ of an ounce; beef stew or mutton stew, 8 ounces.

Dinner: Barley soup, 8 ounces; bread, 4 ounces; roast mutton or roast beef, 8 ounces; potatoes, 8 ounces; other vegetables, 6 ounces; pickles, 1 ounce; rice pudding with sauce, 6 ounces.

Supper: Tea, $\frac{1}{4}$ of an ounce; bread, 6 ounces; butter, 1 ounce; milk, 2 ounces; sugar, 1 ounce; dried chipped beef, 3 ounces, or canned salmon, 4 ounces; apple sauce or stewed dried fruit or baked fresh fruit, 4 ounces.

SUNDAY

Breakfast: Coffee, 1 ounce; bread, 4 ounces; butter, 1 ounce; milk, 6 ounces; sugar, $\frac{3}{4}$ of an ounce; oatmeal, 1 ounce; beefsteak, 6 ounces.

Dinner: Rice soup, 8 ounces; bread, 4 ounces; roast beef or roast or boiled fowl, 8 ounces; potatoes, 8 ounces; other vegetables, 6 ounces; pickles, 1 ounce; bread pudding with sauce or frozen custard, 8 ounces; fresh fruit, 6 ounces.

Supper: Tea, $\frac{1}{4}$ of an ounce; bread, 6 ounces; butter, 1 ounce; milk, 2 ounces; sugar, 1 ounce; cold roast mutton or cold roast beef, 4 ounces; stewed dried fruit or baked fresh fruit or apple sauce, 4 ounces.

The above daily dietary is observed as far as is practicable for patients in the hospital. When indications arise, the medical officer outlines restrictions or special diet as the case may require. The weight of various amounts of food indicated in ounces applies to articles as purchased, with the exception of soups, puddings, etc. Soups mentioned in the above dietary are composed of 4 ounces of meat and an equal quantity of potatoes for each portion. When bread is mentioned, it includes loaf, rolls and other forms in reasonable variety and good quality. Sirup or honey not to exceed one ounce is allowed at breakfast if desired. It is understood that the dietary is provided at all times with vinegar, salt and the usual condiments. According as the season permits, fruits and berries are substituted for the desserts prescribed, and under the term, "other vegetables," provision is allowed for additional fresh food, such as the abundance of the local market permits.

REGULAR DIET FOR TUBERCULOSIS INFIRMARY

(All quantities are of cooked food, as served)

MONDAY

Breakfast: Oatmeal, 8 ounces; milk, 4 ounces; bread, 4 ounces; butter, $\frac{1}{2}$ ounce; coffee, 16 ounces.

Dinner: Vegetable soup, 12 ounces; corned beef, 7 ounces; potatoes, 9 ounces; bread, 4 ounces; bread pudding, 6 ounces.

Supper: Apple sauce, 8 ounces; bread, 4 ounces; butter, $\frac{1}{2}$ ounce; tea, 16 ounces.

Regular Diet for Tuberculosis Infirmary—Continued

TUESDAY

- Breakfast:* Hominy, 8 ounces; milk, 4 ounces; bread, 4 ounces; butter, $\frac{1}{2}$ ounce; coffee, 16 ounces.
- Dinner:* Fish chowder, 14 ounces; bread, 4 ounces; coffee, 16 ounces; rice pudding, 6 ounces.
- Supper:* Pea or lentil soup, 12 ounces; crackers, 4 ounces; tea, 16 ounces; bread and butter.

WEDNESDAY

- Breakfast:* Rolled wheat, 8 ounces; milk, 4 ounces; bread, 4 ounces; butter, $\frac{1}{2}$ ounce; coffee, 16 ounces.
- Dinner:* Pot-roast beef or chopped roast beef, 5 ounces; gravy; potatoes, 8 ounces; one vegetable, 4 ounces; bread, 4 ounces; farina pudding, 6 ounces.
- Supper:* Stewed prunes, 8 ounces; bread, 8 ounces; butter, $\frac{1}{2}$ ounce; tea, 16 ounces.

THURSDAY

- Breakfast:* Indian meal, 8 ounces; milk, 4 ounces; bread, 4 ounces; butter, $\frac{1}{2}$ ounce; coffee, 16 ounces.
- Dinner:* Boiled mutton, 4 ounces, with broth, 8 ounces; bean polenta or lentils, 8 ounces; bread, 4 ounces; cracker pudding, 6 ounces.
- Supper:* Boiled rice, 6 ounces, with milk, 4 ounces; bread, 4 ounces; butter, $\frac{1}{2}$ ounce; tea, 16 ounces.

FRIDAY

- Breakfast:* Oatmeal, 8 ounces; milk, 4 ounces; bread, 4 ounces; butter, $\frac{1}{2}$ ounce; coffee, 16 ounces.
- Dinner:* Fresh fish, 6 ounces; potatoes, 8 ounces; bread, 4 ounces; hominy pudding, 6 ounces; tea, 16 ounces.
- Supper:* Apple sauce, 8 ounces; bread, 8 ounces; butter, $\frac{1}{2}$ ounce; tea, 16 ounces.

SATURDAY

- Breakfast:* Rolled wheat, 8 ounces; milk, 4 ounces; bread, 4 ounces; butter, $\frac{1}{2}$ ounce; coffee, 16 ounces.
- Dinner:* Beef stew, 16 ounces (potato in stew); bread, 4 ounces; farina pudding, 6 ounces.
- Supper:* Farina pudding, 6 ounces, with milk, 4 ounces; bread, 4 ounces; butter, $\frac{1}{2}$ ounce; tea, 16 ounces.

SUNDAY

- Breakfast:* Hominy, 8 ounces, with milk, 4 ounces; bread, 4 ounces; butter, $\frac{1}{2}$ ounce; coffee, 16 ounces.
- Dinner:* Barley soup, 12 ounces; roast beef, 5 ounces; potatoes, 8 ounces; bread, 4 ounces; corn starch pudding, 6 ounces.
- Supper:* Stewed prunes, 8 ounces; bread, 4 ounces; butter, $\frac{1}{2}$ ounce; tea, 16 ounces.

In addition to the regular diet as outlined above, patients were given:

Forenoon lunch—10 A.M.: 1 raw egg with 8 ounces of milk.

11 A.M.: Usual dose of cod-liver oil emulsion, as directed.

Afternoon lunch—3 P.M.: 1 raw egg with 8 ounces of milk.

4.30 P.M.: Usual dose of cod-liver oil emulsion, as directed.

After-Supper lunch—8 ounces of milk.

DAILY MENUS AT THE LOOMIS SANATORIUM,
LIBERTY, N. Y.

ANNEX DIVISION

Cost per Person per Day, 30 Cents

MONDAY

- Breakfast:* Oranges; shredded wheat; sausage; corn bread; bread; butter; coffee—cocoa; milk—cream.
- Dinner:* Soup; fricassee chicken; tomatoes; mashed potato; ice-cream; bread; butter; milk.
- Supper:* Boston beans; catsup; chocolate cake; marmalade; bread; butter; cocoa—tea; milk.

TUESDAY

- Breakfast:* Bananas; oatmeal; French toast; maple sirup; bread; butter; coffee—cocoa; milk—cream.
- Dinner:* Soup; roast beef; string beans; boiled potato; rice pudding; bread; butter; milk.
- Supper:* Creamed dried beef; baked potato; apple sauce; bread; butter; cocoa; milk.

WEDNESDAY

- Breakfast:* Stewed pears; cream of wheat; bacon, graham muffins; bread; butter; coffee—cocoa; milk—cream.
- Dinner:* Soup; boiled lamb; rice; pears; steamed pudding; bread; butter; milk.
- Supper:* Corned beef hash; peaches; spice cake; bread; butter; cocoa; milk.

THURSDAY

- Breakfast:* Prunes; oatmeal; griddle cakes; maple sirup; bread; butter; milk—cream; coffee—cocoa.
- Dinner:* Soup; roast beef; potato; corn; tapioca pudding; bread; butter; milk.
- Supper:* Cold sliced meat; fried potato; mixed pickle; cookies; bread; butter; cocoa—milk.

FRIDAY

- Breakfast:* Stewed figs; hominy; eggs; bread; butter; milk—cream; coffee—cocoa.
- Dinner:* Soup; fish; potato; tomatoes; bread pudding; bread; butter; milk.
- Supper:* Macaroni—cheese; layer cake; pineapple; bread; butter; cocoa—milk.

SATURDAY

- Breakfast:* Bananas; Pettijohn's; cod fish cakes; rolls; bread; butter; milk—cream. coffee; cocoa.
- Dinner:* Soup; corned beef; potato; cabbage; pie—cheese; bread; butter; milk.
- Supper:* Lamb stew; vegetables; cinnamon rolls; bread; butter; cocoa—milk.

SUNDAY

- Breakfast:* Rhubarb; oatmeal; French toast; sirup; bread; butter; coffee—cocoa; milk—cream.
- Dinner:* Soup; steak; potato; lima beans; baked custard; bread; butter; milk.
- Supper:* Cold ham; creamed potato; lemon jelly; soda biscuit; bread; butter; cocoa—milk.

INTERMEDIATE DIVISION

Cost per Person per Day, 40 Cents

MONDAY

- Breakfast:* Bananas; oatmeal; boiled eggs; rolls; butter; coffee—cocoa; milk—cream.
- Dinner:* Bouillon; roast spare ribs; sauerkraut; sweet potato; boiled potato; plum pudding; brandy sauce; bread; butter; milk.
- Supper:* Roast beef hash; chicken salad; lemon jelly; whipped cream; bread; butter; cocoa—tea; milk.

TUESDAY

- Breakfast:* Oranges; wheatena; eggs; potato scones; bread; butter; coffee—cocoa; milk—cream.
- Dinner:* Bean purée; roast veal; potato; parsnips; lettuce; pie; bread; butter; milk.
- Supper:* Lamb chops; boiled rice; plums; cake; bread; butter; tea—cocoa; milk—cream.

WEDNESDAY

- Breakfast:* Apricots; Saxon wheat; bacon; griddle cakes; sirup; bread; butter; coffee—cocoa; milk—cream.
- Dinner:* Vegetable soup; broiled steak; tomatoes; potato; tapioca pudding; bread; butter; milk.
- Supper:* Cold ham; creamed potato; fruit salad; Boston cookies; raspberries; bread; butter; cocoa—tea; milk.

THURSDAY

- Breakfast:* Prunes; Pettijohn's; eggs to order; muffins; bread; butter; coffee—cocoa; milk—cream.
- Dinner:* Soup; roast beef; browned potato; beets; steamed pudding; foamy sauce; bread; butter; milk.
- Supper:* Lamb stew; biscuit; peaches; cake; bread; butter; tea—cocoa; milk.

FRIDAY

- Breakfast:* Oranges; oatmeal; cod fish cakes; rolls; butter; coffee—cocoa; milk—cream.
- Dinner:* Soup; fish; asparagus; potato; rice pudding; bread; butter; milk.
- Supper:* Steak; French fried potato; lettuce; pears; cookies; bread; butter; cocoa—milk.

SATURDAY

- Breakfast:* Bananas; hominy; bacon; corn bread; bread; butter; coffee—cocoa; milk—cream.
- Dinner:* Cream soup; roast lamb; potato; corn; baked custard; caramel sauce; bread; butter; milk.
- Supper:* Cold meat; macaroni; tomatoes; apple sauce; layer cake; bread; butter; cocoa—tea; milk.

SUNDAY:

Breakfast: Grape fruit; farina; omelet; muffins; butter; coffee—cocoa; milk—cream.
Dinner: Tomato bisque; roast duck; stuffing; gooseberry jam; creamed onions; mashed potato; ice cream; bread; butter; milk.
Supper: Cold roast beef; browned potato; cocoanut cake; bread; butter; cocoa—tea; milk.

DIETARIES FOR PETER BRIGHAM HOSPITAL, BOSTON
HIGH CALORIE TYPHOID DIET

	Amount	Calories
7 A.M.		
Eggs.....	50 grams	74.05
Toast.....	20 "	52.18 without crust
Butter.....	20 "	153.8
Lactose.....	10 "	40
Sucrose.....	8 "	32 for each cup
Cream.....	50 c.c.	190.4
Coffee.....	70 "	0
9 A.M.		
Milk.....	150 c.c.	103.8
Cream.....	50 "	190.4 Milk preparation, 200 c.c.
Lactose.....	10 grams	40
11 A.M.		
Potato.....	50 grams	55.81
Custard.....	120 "	170
Minced creamed chicken or a substitute dish.....	135 "	382.95
Bread.....	20 "	52.18
Butter.....	20 "	153.8
Lactose.....	10 "	40
Sucrose.....	8 "	32
Tea.....	70 c.c.	0
Cream.....	50 "	190.4
1 P.M.		
Lemon juice (flavor).....	25 c.c.	9.8
Lactose solution 20 per cent....	175 "	35 Lactose lemonade, 200 c.c.
Sucrose.....	10 grams	40
3 P.M.		
Cream.....	100 c.c.	380
Milk.....	100 "	69.2
Ice-cream.....	290 "	
Egg (1).....	50 grams	74.05
Lactose.....	20 "	80
Sucrose.....	20 "	80

HIGH CALORIE TYPHOID DIET—*Continued*

	Amount	Calories
5 P.M.		
Cream of wheat.....	60 grams	32.574
Cream.....	40 c.c.	152.32
Milk (if necessary).....	40 "	27.68
Lactose.....	10 grams	40
Sucrose.....	8 "	32
Tea.....	70 c.c.	0
Cream.....	50 "	190.4
Milk.....	65 "	44.98
Cocoa.....	5 grams	24.865 instead of tea
Lactose.....	10 "	40
Sucrose.....	8 "	
9 P.M.		
Milk preparation as at 9 A.M. . .	200 c.c.	
11 P.M.		
Milk.....	154 c.c.	100.34
Cream.....	50 "	190.4
Lactose.....	10 grams	40
Cocoa.....	5 "	24.865
5 A.M.		
Milk.....	65 c.c.	44.98
Cream.....	70 "	266.56
Cocoa.....	5 grams	24.865 Hot cocoa, 120 c.c.
Lactose.....	10 "	40
Sucrose.....	8 "	32

The physician prescribes the number of feedings, the calories and the amounts of protein, fats, carbohydrates and salts in grams, and the total fluids when necessary. The prescription is filled by the dietitian with food that meets the requirements.

A high caloric diet for nephritis is furnished by the menu arranged below:

Breakfast, 7.30 A.M.

Apple.....	50 grams
Farina.....	150 "
Dates or prunes.....	10 "
Two eggs in ramekin.....	100 "
Toast.....	20 "
Butter.....	5 "
Coffee.....	150 c.c.
Milk.....	25 "
Sugar.....	10 grams
Cream.....	10 c.c.

10 A.M.

Eggnog:

1 egg.....	50 grams
Sugar.....	5 "
Milk.....	100 c.c.
Sherry.....	20 "

Dinner, 12 M.

Tomato bisque

Milk.....	100 c.c.
Tomato juice.....	100 "
Broiled steak.....	200 grams
Stuffed potato.....	100 "
Butter.....	5 "
Bread and butter.....	5 "

Cocoa; cornstarch pudding

Milk.....	100 c.c.
1 egg.....	50 grams
Sugar.....	10 "
Cornstarch.....	5 "
Cocoa.....	5 "

Tea..... 150 c.c.

Cream..... 20 "

Sugar..... 5 grams

3 P.M.

Grape juice and water, each 90 c.c. and crushed ice

Supper, 5 P.M.

Sliced chicken.....	100 grams
Spinach.....	100 "
One hard cooked egg.....	50 "
Bread.....	20 "
Butter.....	5 "
Scalloped macaroni.....	100 "
Bread crumbs.....	10 "
American cheese.....	50 "
Milk.....	25 c.c.
Butter.....	10 grams
Tea.....	150 c.c.
Cream.....	10 "
Sugar.....	5 grams

REGULAR DIET FOR TUBERCULOSIS INFIRMARY, METROPOLITAN HOSPITAL, BLACKWELL'S ISLAND, N. Y.

MONDAY

- Breakfast:* Oatmeal, 8 ounces; milk, 4 ounces; bread, 4 ounces; butter, $\frac{1}{2}$ ounce; coffee, 16 ounces.
- Dinner:* Vegetable soup, 12 ounces; corned beef, 7 ounces; potatoes, 9 ounces; bread, 4 ounces; bread pudding, 6 ounces.
- Supper:* Apple sauce, 8 ounces; bread, 4 ounces; butter, $\frac{1}{2}$ ounce; tea, 16 ounces.

TUESDAY

- Breakfast:* Hominy, 8 ounces; milk, 4 ounces; bread, 4 ounces; butter, $\frac{1}{2}$ ounce; coffee, 16 ounces.
- Dinner:* Fish chowder, 14 ounces; bread, 4 ounces; coffee, 16 ounces; rice pudding, 6 ounces.
- Supper:* Pea or lentil soup, 12 ounces; crackers, 4 ounces; tea, 16 ounces; bread and butter.

WEDNESDAY

- Breakfast:* Rolled wheat, 8 ounces; milk, 4 ounces; bread, 4 ounces; butter, $\frac{1}{2}$ ounce; coffee, 16 ounces.
- Dinner:* Pot-roast beef or chopped roast beef, 5 ounces; gravy; potatoes, 8 ounces; one vegetable, 4 ounces; bread, 4 ounces; farina pudding, 6 ounces.
- Supper:* Stewed prunes, 8 ounces; bread, 8 ounces; butter, $\frac{1}{2}$ ounce; tea, 16 ounces.

THURSDAY

- Breakfast:* Indian meal, 8 ounces; milk, 4 ounces; bread, 4 ounces; butter, $\frac{1}{2}$ ounce; coffee, 16 ounces.
- Dinner:* Boiled mutton, 4 ounces; with broth, 8 ounces; bean polenta or lentils, 8 ounces; bread, 4 ounces; cracker pudding, 6 ounces.
- Supper:* Boiled rice, 6 ounces; with milk, 4 ounces; bread, 4 ounces; butter, $\frac{1}{2}$ ounce; tea, 16 ounces.

FRIDAY

- Breakfast:* Oatmeal, 8 ounces; milk, 4 ounces; bread, 4 ounces; butter, $\frac{1}{2}$ ounce; coffee, 16 ounces.
- Dinner:* Fresh fish, 6 ounces; potatoes, 8 ounces; bread, 4 ounces; hominy pudding, 6 ounces; tea, 16 ounces.
- Supper:* Apple sauce, 8 ounces; bread, 8 ounces; butter, $\frac{1}{2}$ ounce; tea, 16 ounces.

SATURDAY

- Breakfast:* Rolled wheat, 8 ounces; milk, 4 ounces; bread, 4 ounces; butter, $\frac{1}{2}$ ounce; coffee, 16 ounces.
- Dinner:* Beef stew, 16 ounces (potato in stew); bread, 4 ounces; farina pudding, 6 ounces.
- Supper:* Farina pudding, 6 ounces; milk, 4 ounces; bread, 4 ounces; butter, $\frac{1}{2}$ ounce; tea, 16 ounces.

SUNDAY

Breakfast: Hominy, 8 ounces, with milk, 4 ounces; bread, 4 ounces; butter, $\frac{1}{2}$ ounce; coffee, 16 ounces.

Dinner: Barley soup, 12 ounces; roast beef, 5 ounces; potatoes, 8 ounces; bread, 4 ounces; corn starch pudding, 6 ounces.

Supper: Stewed prunes, 8 ounces; bread, 4 ounces; butter, $\frac{1}{2}$ ounce; tea, 16 ounces.

The quantities stated in the above dietary are of cooked food ready to serve.

In addition to the regular diet as outlined in the foregoing dietary, patients were given:

Forenoon lunch, 10 A.M.: 1 raw egg in 8 ounces of milk.

11 A.M.: Usual dose of cod-liver oil emulsion.

Afternoon lunch, 3 P.M.: 1 raw egg in 8 ounces of milk.

4.30 P.M.: Usual dose of cod-liver oil emulsion.

After-Supper lunch, 8 P.M.: 8 ounces of milk.

SPECIAL DIET FOR PATIENTS IN BED

Breakfast: Same as outlined in regular diet.

Dinner: Steak, 4 to 6 ounces; potatoes, 8 ounces; 1 raw egg with 4 ounces milk.

Supper: Same as outlined in regular diet.

Daily maximum allowance of milk, 32 ounces.

LIGHT DIET

Breakfast: Cereal, 8 ounces; egg, 1 raw, with milk, 4 ounces; toast and milk.

Dinner: Same as breakfast.

Supper: Same as breakfast, with lemon jelly or boiled rice or farina pudding replacing cereal.

Daily maximum allowance of milk, 48 ounces.

LIQUID DIET

Boiled milk.

Albumin-water, *ad libitum*.

Broths.

Scorched farinaceous food.

Daily maximum of milk, 48 ounces.

DIETARY, BROMPTON HOSPITAL FOR CONSUMPTION, LONDON,
ENGLAND

FULL A DIET

MONDAY

Breakfast—8.30 A.M.: Bread and butter; rasher of bacon; coffee, or cocoa.

Lunch—11 A.M.: Milk, half pint.

Dinner—12.30 or 1 P.M.: Roast leg mutton; boiled potatoes; cabbage; sago pudding.

Tea—5 P.M.: Bread and dripping; tea or cocoa.

Supper—8 P.M.: Milk, half pint.

TUESDAY

<i>Breakfast</i> —8.30 A.M.:	Bread and butter; rasher of bacon; coffee, or cocoa.
<i>Lunch</i> —11 A.M.:	Milk, half pint.
<i>Dinner</i> —12.30 or 1 P.M.:	Roast pork (winter) with sage and onions; roast lamb (summer) with mint sauce; boiled potatoes; boiled carrots; rice pudding.
<i>Tea</i> —5 P.M.:	Bread and butter; tea or cocoa.
<i>Supper</i> —8 P.M.:	Milk, half pint.

WEDNESDAY

<i>Breakfast</i> —8.30 A.M.:	Bread and butter; rasher of bacon; tea, coffee, or cocoa.
<i>Lunch</i> —11 A.M.:	Milk, half pint.
<i>Dinner</i> —12.30 or 1 P.M.:	Pea soup; boiled potatoes; boiled carrots; plum pudding.
<i>Tea</i> —5 P.M.:	Bread and butter; tea or cocoa.
<i>Supper</i> —8 P.M.:	Milk, half pint.

THURSDAY

<i>Breakfast</i> —8.30 A.M.:	Bread and butter; rasher of bacon; coffee, or cocoa.
<i>Lunch</i> —11 A.M.:	Milk, half pint.
<i>Dinner</i> —12.30 or 1 P.M.:	Roast leg mutton; boiled potatoes; boiled turnips; suet pudding with golden sirup, alternately with jam roly-poly pudding.
<i>Tea</i> —5 P.M.:	Bread and butter; tea, or cocoa.
<i>Supper</i> —8 P.M.:	Milk, half pint.

FRIDAY

<i>Breakfast</i> —8.30 A.M.	Bread and butter; rasher of bacon; coffee, or cocoa.
<i>Lunch</i> —11 A.M.:	Milk, half pint.
<i>Dinner</i> —12.30 or 1 P.M.:	Roast beef; boiled potatoes; boiled cabbage; plain boiled rice or cornflour mold with stewed fruits.
<i>Tea</i> —5 P.M.:	Bread and butter; tea, or cocoa.
<i>Supper</i> —8 P.M.:	Milk, half pint.

SATURDAY

<i>Breakfast</i> —8.30 A.M.:	Bread and butter; rasher of bacon; coffee, or cocoa.
<i>Lunch</i> —11 A.M.:	Milk, half pint.
<i>Dinner</i> —12.30 or 1 P.M.:	Roast leg mutton; boiled potatoes; boiled turnips; semolina pudding.
<i>Tea</i> —5 P.M.:	Bread and dripping; tea, or cocoa.
<i>Supper</i> —8 P.M.:	Milk, half pint.

SUNDAY

<i>Breakfast</i> —8.30 A.M.:	Bread and butter; rasher of bacon; coffee, or cocoa.
<i>Lunch</i> —11 A.M.:	Milk, half pint.
<i>Dinner</i> —12.30 or 1 P.M.:	Cold roast beef; potatoes; beetroot (winter); salad (summer); plain pudding.
<i>Tea</i> —5 P.M.:	Bread and butter; tea, or cocoa.
<i>Supper</i> —8 P.M.:	Milk, half pint.

Full B Diet is the same as Full A Diet, with the addition of one rasher of bacon (breakfast), one pint of milk, $\frac{1}{2}$ ounce of butter, and one egg (tea).

Light B Diet is the same as Full B Diet, with chicken, two days; fish, three days; rabbit, two days; substituted for the meat supplied at dinner.

Light A Diet is the same as Full A Diet, with chicken, two days; fish, three days; rabbit, two days; substituted for the meat supplied at dinner.*

Half Diet for Children under 12. "Half" written before any diet signifies that half the quantity of meat is to be supplied.

Allowances of the various constituents, of the diets per patient are as follows:

Mutton, pork, lamb: 12 ounces for men; 8 ounces for women. Beef, without bone: 11 ounces for men; 7 ounces for women.

Bread, 10 ounces; butter, $1\frac{1}{2}$ ounces; potatoes, $5\frac{1}{2}$ ounces; vegetables: turnips, cabbage, etc., 5 ounces; egg, 2 ounces; bacon, 3 ounces rasher, man; 2 ounces rasher, woman; tea, $\frac{1}{4}$ ounce; coffee, $\frac{1}{2}$ ounce; sugar, 2 ounces; cocoa $1\frac{1}{2}$ ounces; milk, $1\frac{1}{2}$ pints.

On Sundays, Wednesdays, and Thursdays, milk puddings, rice, sago, and semolina, to be supplied for eight patients on each Gallery, instead of the suet puddings.

Light A and B Diets: Chicken, 8 ounces (9 ounces bacon fat to be supplied with each chicken and rabbit diet); fish, 8 ounces lemon sole, plaice, whiting, or haddock.

One rabbit to three patients, *i.e.*, about 8 ounces per patient; one pound onions to be supplied with each rabbit diet.

CHAPTER XXVIII

READY REFERENCE—DIETETIC GUIDES

Dietaries: Anemia and Debility; Atony of the Stomach; Bilioussness—Liver Troubles; Acute Bright's Disease; Chronic Bright's Disease; Tuberculosis; Constipation; Diabetes; Diarrhea; Dilatation of the Stomach; Dyspepsia; Epilepsy; Fevers; Gonorrhea; Gout; Hyperchlorhydria or Hyperacidity; Intestinal Dyspepsia; Malnutrition and Chronic Malaria; Nursing Mothers; Neurasthenia and Nervous Prostration; Obesity; Pregnancy; Rheumatic Fever; School Children; Ulcer of the Stomach.

Madah Reducing Dietaries.

The dietaries outlined in this chapter are compiled from the works of various authors and conveniently arranged for ready reference. Cross references will guide the reader to sections of the work dealing *in extenso* with the same subject.

DIETARIES

Anemia and Debility.—(Volume III, Chapter VI.)

ALLOWED:

Soups: Broths, all kinds. May add macaroni or vermicelli.

Fish: All fresh fish, raw oysters.

Meats: Chopped or scraped, raw or rare; mixed with broths, chocolate, or Burgundy and water, or made into sandwiches. Ham, broiled bacon, beef juice, mutton, chicken, game, cod-liver oil as food, butter plentifully, Mosquera's beef-meal jelly, brains, liver, panopepton, somatose, bone marrow, Valentine's meat juice.

Eggs: Soft-boiled, poached, scrambled, baked, raw, beaten up with sherry or with whiskey.

Farinaceous: Bread, cakes, tapioca, sago, grits, barley, hominy, cracked wheat, graham grits, rolled oats, crackers, shredded wheat biscuit. (Allow in liberal quantities unless there is indigestion.)

Vegetables: Most kinds well boiled, or as purées.

Desserts: Sweet fruits, custards, calf's-foot jelly, fruit jam, jellies, baked apples, baked pears, prunes, marmalade, egg-and-milk pudding, honey, cake, chocolate.

Beverages: Carbonic water, ozonized water, milk, cream, equal parts of milk and very hot water taken one hour before eating; chocolate, cocoa, peptonized milk, malted milk, kumiss, kefir. Mineral waters: Poland, Highland Spring, Oak Orchard, Richfield, Sharon, White Sulphur, Saratoga, Homburg, Kissingen, Royat, Bath, Vichy, Apollinaris.

Stimulants: Claret, Madeira, porter, stout, beer. For those who cannot digest milk, try cream and hot water, half-cupful of each; add five to ten grains bicarbonate soda, and one teaspoonful of brandy.

FORBIDDEN:

Hashes, stews, cooked oysters, clams, pork, veal, thin soups, turkey, salt meats, except ham and bacon; cabbage, cucumbers, turnips, carrots, squash, spices, pickles, vinegar, pies, pastry, bananas, pine-apples.

GENERAL RULES:

Generous nutritious diet is important. Readily digested food should be given often and in small quantities. If patient be fat, lessen hydrocarbons and increase proteins; if thin and poorly nourished, give more starches and fats.

GENERAL DIRECTIONS:

1. Abundant rest, especially in well-ventilated rooms (sunny if possible), in the open air, and in the sunshine.

2. Moderate exercise, gradually increased, but always stopping short of fatigue. It should be taken preferably in several short walks rather than one long one. Patients suffering from anemia, and invalids generally, often bear better the exercise taken after noon.

3. Regular daily skin friction, preceded by tepid or rapid cold sponging. Very few anemia patients can take cold baths.

4. Be sure that the teeth are in good condition and well used.

5. Meals should be frequent, not at long intervals. Some nourishment—hot or cold milk, with or without a little brandy, or tea, made with milk instead of water—should be given half an hour before rising.

6. An insufficient quantity of fluid is a frequent cause of constipation in anemia. It is a common experience that no remedies help the anemia so long as the constipation (often its cause) lasts. Anemic patients should be instructed to take not less than two and a half to three pints of fluid daily. By this and other means, if necessary, any constipation must be relieved.

Atony of the Stomach.—(Volume III, Chapter II.)

ALLOWED:

Soups (sparingly).

Fish: Raw, broiled, or stewed oysters, broiled or boiled mackerel, rock, bass, trout or blue-fish.

Meats: Boiled brains, boiled or broiled sweetbreads, raw scraped, boiled or broiled beef, broiled steak, roasted mutton, broiled chops, roast lamb, boiled, broiled or roasted chicken, broiled or roasted squab, roast turkey, broiled or roast birds.

Eggs: Raw, soft-boiled or poached.

Farinaceous: Rice, cornstarch, sago, tapioca, arrowroot, hominy, grits, vermicelli, cream of wheat, stale wheat bread, toast, graham bread, cornbread, pulled bread, Zwieback.

Vegetables: Asparagus, spinach, peas, string beans, lima beans (best mashed and strained), potatoes (baked or mashed), turnips, carrots, lettuce (without vinegar), cresses (without vinegar).

Fruits: Lemons, oranges, raw (scraped), baked or stewed apples, grapes, stewed apricots, raw or stewed peaches, stewed pears, stewed prunes, figs.

Fatty Foods: Butter, cream.

Desserts: Blancmange, honey, custards, rice pudding, tapioca pudding, bread pudding.

Beverages: Taken mainly between meals. Milk, buttermilk, malted milk, peptonized milk, milk with lime water, milk with Vichy, milk flavored with tea, milk flavored with coffee, kefir, kumiss, junket, whey, cocoa, albumin water, water (not with meals), hot water, grape juice.

FORBIDDEN:

Soups, fried foods, pork, veal stews, hashes, corned meat, potted meat, liver, kidney, duck, goose, sausage, crabs, lobsters, preserved fish, smoked fish, salmon, salt mackerel, sardines, cauliflower, celery, radishes, cabbage, cucumber, sweet potatoes, beets, salads, hot bread or

cakes, nuts, candies, pies, pastry, cheese, strong coffee, alcoholic stimulants, ice water, ice cream.

Biliousness—Liver Troubles.—(Volume III, Chapter IV.)

ALLOWED:

Soups: Vegetable soups with a little bread or cracker, light broths.

Fish: Boiled fresh cod, bass, sole or whiting, raw oysters.

Meats: Tender lean mutton, lamb, chicken, game (all sparingly).

Farinaceous: Oatmeal, hominy, tapioca, sago, arrowroot (well cooked), whole wheat bread, graham bread, dry toast, crackers.

Vegetables: Mashed potato, almost all fresh vegetables (well boiled), plain salad of lettuce, watercress, dandelions.

Desserts: Plain milk pudding of tapioca, sago, arrowroot, or stewed fresh fruit (all without sugar or cream), raw, ripe fruits.

Drinks: Weak tea or coffee (without sugar or cream), hot water, pure, plain or aerated water.

FORBIDDEN:

Strong soups, rice-made dishes of any kind, hot bread or biscuits, preserved fish or meats, curries, red meats, eggs, fats, butter, sugar, herrings, eels, salmon, mackerel, sweets, creams, cheese, dried fruits, nuts, pies, pastry, cakes, malt liquors, sweet wines, champagne.

GENERAL RULES:

Diet liberal and varied as possible; moderation in animal foods. Avoid sugars and fermented liquors; take moderately and carefully the starches and fats. Strumous lithemic patients require a larger proportion of fats. Nuts are very desirable, especially pecans, English walnuts, almonds, etc.

Acute Bright's Disease.—(Volume III, Chapter IX.)

ALLOWED:

Soups: Arrowroot soup with onion, milk soup with rice, tapioca or vermicelli gruel, cream of celery, potato soup, tomato soup, corn soup.

Fish: Fresh whitefish, raw oysters, clams.

Meats (very little): Very little red meats, mostly the white kinds; chicken, game, fresh pork, bacon, calf's head, ham, veal, turkey.

Eggs: Very little, if any.

Farinaceous: Wheaten bread, rice (whole, plain boiled, baked with

milk, ground), oatmeal, are the most suitable, but the following may also be taken: arrowroot (plasmon, plain), corn flour, tapioca, sago (water or milk), hominy, macaroni, vermicelli.

Vegetables (in plenty, well cooked): The green sorts generally, spinach, summer or green cabbage, turnip tops, mushrooms, celery, salads, rhubarb, cresses, lettuce, onions, cauliflower, brussels sprouts.

Fruits: Oranges, grapes, lemons, grape fruit (pomelo), apples and pears. The juice of pineapple, oranges, lemons, pomelos and apricots.

Fats: Butter, cream, olive oil, almonds, nut foods.

Desserts: Milk and rice puddings, stewed fruits, raw fruits (especially laxative), fruit jelly, junket, custard, bread pudding.

Beverages: Weak tea, peptonized milk, plenty of pure water, milk, kumiss, zoolak, whey, barley water, hot water an hour before meals, buttermilk, Bordeaux and Seltzer. Mineral waters: Bethesda, Clysmic, Berkely, Gettysburg, Poland, Highland Springs, Vittel, Wildungen, Vals, Bath.

Stimulants: None.

FORBIDDEN:

Red meats, highly seasoned food, fried fish, cooked oysters, beef, mutton, lamb, corned beef, hashes, stews, made dishes, sauces, spices, peas, beans, lentils, pies, pastry, cheese, new bread, cakes, ices, sweets, coffee, tobacco, malt liquors, spirituous liquors.

GENERAL RULES:

In acute cases use milk diet exclusively. Take readily assimilable foods that leave a small amount of nitrogenous waste-matter to be eliminated by the kidneys. Danger in overfeeding. Use fats to replace meats. Attend carefully to the teeth after each meal. Meals should be small and should be taken frequently. A suitable interval between meals would be 4 hours, between the hours of 6 A.M. and 10 P.M. In this condition overeating might induce grave danger, so eat moderately and masticate thoroughly.

1. A quiet life without worry or excitement.
2. A warm, dry house, on gravel for choice, protected from north or northeast winds.
3. A warm, dry, equable climate.

4. Woolen clothing next the skin, night and day, all the year round.

5. Be sure that the boots are sound, that a body-belt is worn, and that every possible care is taken to avoid "catching cold."

6. Hot-air, vapor or Turkish baths; daily tepid sponging, with skin friction. Avoid hot and cold baths, but warm baths may be taken.

7. Regulate daily exercise, always stopping short of fatigue.

8. Maintain a free, regular action of the skin, kidneys and bowels.

Chronic Bright's Disease.—(Volume III, Chapter IX.)

ALLOWED:

Soups: Vegetable or fish soup, broths with rice or barley.

Fish: Raw oysters or raw clams, fresh fish broiled or boiled.

Meats: Eat sparingly chicken, game, fat bacon, fat ham.

Farinaceous: Stale bread, whole wheat bread, graham bread, toast, milk toast, biscuits, macaroni, rice, cereals of all kinds.

Vegetables: Onions, cauliflower, mashed potatoes, mushrooms, lettuce, watercress, spinach, celery, cabbage.

Fruits: Lemons, oranges, raw, baked or stewed apples, prunes, pears and grapes.

Fatty Foods: Butter.

Desserts: Ripe raw fruits, stewed fruits, rice, tapioca, bread and milk puddings, junkets, cocoa.

Beverages: Toast water, weak tea, pure water, Manacea water, peptonized milk, Horlick's malted milk, fresh buttermilk, milk with hot water (equal parts), whey, clabber and unfermented grape juice.

Stimulants: To be carefully avoided.

FORBIDDEN:

Fried fish, corned beef, hashes (all kinds), stews, pork, veal, heavy bread, batter cakes, lamb, mutton, beef, gravies, beans, peas, malt or spirituous liquors, tobacco, cigars, cigarettes, ice cream, cake, pies and pastry.

When the kidneys are burdened, limit the supply of nitrogenous foods. Large amounts of animal food and alcohol-producing foods should be restricted. Improvement under an exclusive milk diet is often very gratifying. There is no limit to the quantity of milk—

all that the patient can and will take. If patient loses weight on milk diet, allow farinaceous foods, rice, or bread and hominy.

GENERAL DIRECTIONS:

1. A quiet life without worry or excitement.
2. A warm, dry house, on gravel for choice, protected from north and northeast winds.
3. A warm, dry, equable climate.
4. Woolen clothing next the skin, night and day, all the year round.
5. Be sure that the boots are sound, that a body-belt is worn, and that every possible care is taken to avoid "catching cold."
6. Hot-air, vapor or Turkish baths; daily tepid sponging, with skin friction. Avoid hot and cold baths, but warm baths may be taken.
7. Regulate daily exercise, always stopping short of fatigue.
8. Maintain a free, regular action of the skin, kidneys and bowels.

Tuberculosis.—(Volume III, Chapter V.)

ALLOWED:

Soups: Bouillon, clam broth, chicken broth, mutton broth; barley, rice, bean and pea broth, beef juice and tea, oyster soup, turtle soup.

Fish: Fresh fish, raw oysters, eels, fresh salmon, mackerel and cod-fish. Any other fish may be taken occasionally when those specially recommended are out of season. Cook by grilling, boiling, steaming or stewing.

Meats: Beef, raw, underdone, scraped or pounded; roast mutton, lamb chops, poultry, game, bacon, ham, sweetbread, Mosquera's beef meal and jelly, beef juice, liquid peptonoids, brains, liver, somatose, panopepton, Valentine's meat juice.

Eggs: Six to twelve raw eggs daily or beat with milk, whiskey or sherry.

Farinaceous: Wheat bread, stale or toasted; rusk, crackers, rice, cracked wheat, Indian meal bread with plenty of butter, oat-meal, malt extracts, hominy, mush, milk toast, cream of wheat, granose, macaroni, spaghetti.

Vegetables: Onions, tomatoes, string beans, spinach, asparagus, let-

tuce, cresses, celery, greens, peas, rice, well cooked; baked potatoes.

Fruits: Bananas, figs, dates and prunes may be taken regularly. All the other fruits may be taken occasionally if they are not made to take the place of some nourishing food.

Fats and Oils: Mutton, beef, butter, cream, olive and cod-liver oil, almonds, nuts and nut food, nut butter, cake chocolate, somatose, chocolate, bone marrow. (May assist digestion with pancreatin.)

Desserts: Tapioca and sago puddings, farina, floating island, custards, all fruits, cheese, butter-scotch, honey and milk, olives, junket, rice pudding, wine jelly.

Beverages: Two quarts of buttermilk daily, ozonized water, carbonized water, hot water or hot Vichy water (one-half pint an hour before meals); lemonade, ginger ale, malt preparations, milk, cream, kumiss, zoolak, cocoa, chocolate. Mineral water: Alkaline, iron and sulphur, Oak Orchards, Richfield Springs, Lower Blue Lick, Green Brier, White Sulphur Springs, Red Sulphur Springs, Aix-la-Chapelle, Homburg, Franzensbad, Cheltenham.

Stimulants: May only be taken if specifically ordered by the physician from the following: stout, porter, beer, brandy or whiskey. If brandy is ordered, and a good genuine brandy cannot be obtained, then choose a good whiskey. *That these may only be taken by order of the physician* must be repeated, as much is at stake in the breaking of this rule.

FORBIDDEN:

Pork and veal, and likewise all indigestible meats, stews, gravies, made dishes, rich desserts, pastries, fried potatoes, cucumbers, cabbage, parsnips, carrots, arrowroot, cornstarch, hot bread, cake, fried foods, most sweets, pies and pastry and sweet wines.

GENERAL RULES:

Eat as much as can be possibly digested, mostly fatty and nitrogenous foods. It is important to take food between meals and before going to bed. Do not have meals more than three hours apart. Indigestion dietary often necessary.

SUGGESTIONS FOR MEALS:

Meals should be taken at or about the following hours: Breakfast, 7.30 A.M.; lunch, 10 A.M.; dinner, 12.30 P.M.; supper, 8 P.M. Take those foods which present a minimum of bulk and a maximum of nourishment. In other words, take the foods which are most nourishing and least bulky.

GENERAL DIRECTIONS:

The method of feeding in tuberculosis is as important as the quantity and the quality of the food. All food should be appetizingly cooked and daintily served. The greatest variation possible, even in the matter of serving milk, should be introduced.

1. (a) On waking, milk, hot or warm, gradually increasing in quantity to ten or twelve ounces. It may contain a little sodium phosphate to help the bowels, or sodium bicarbonate or sodium citrate to render it more easy of digestion.

(b) If preferred, there may be given, as a morning stimulant, a breakfastcupful of tea made with milk instead of water.

(c) Breakfast, one hour later, should be substantial. It is better taken in bed before washing and dressing.

(d) One hour and a half after breakfast (so as not to spoil the appetite for luncheon), one raw egg, or two if possible, broken into a glass and swallowed whole, with pepper and salt, or beaten up with a little milk; or raw meat, alone or in sandwich.

(e) Mid-day, a substantial meal. When stimulants are allowed, explicit instructions should be given as to the kind and quantity, and when and how they should be taken.

(f) One hour and a half after luncheon, milk, raw egg or raw meat.

(g) In the afternoon, tea made with milk, or milk with raw egg, or raw meat and abundant bread and butter.

(h) At 7 or 7.30 P.M., a substantial meal.

(i) At bedtime, milk and, if possible, a raw egg in it.

2. Every hour possible should be spent in airy, sunny rooms, or in the open air and sunshine.

3. Clothing should be light and loose. It should be woolen, night and day, winter and summer. The boots should be thick and sound, and contain a cork or other sock to keep the feet not only dry, but warm. Chilled feet may be as harmful as wet feet.

4. All rooms should be bright, and kept well ventilated, night and day.

5. Every night the whole body should be sponged with warm water, or, where the patient can bear it, with cold water (rapidly), followed by friction with a rough towel and a flesh glove. The regular, long-continued attention to the action of the skin forms one of the most important factors in the hygienic treatment of tuberculosis. It should be carried out in a warm room, under conditions which prevent chill; it is better done for, than by, the patient. When there are night sweats, it may be necessary regularly to precede the skin friction by a soap and water cleansing.

6. Regular exercise carefully adapted to each case, regular hours, and the avoidance of fatigue.

Constipation.—(Volume III, Chapter III.)

ALLOWED:

Soups: Broths, oyster soup, sorrel soup.

Fish: All kinds boiled. White sorts broiled. Sardines in oil.

Meats: Most kinds; poultry, game, etc.

Farinaceous: Brown or graham bread, gingerbread, oatmeal porridge, bran bread, bran pudding, whole-meal bread, cornbread, rye bread, shredded wheat biscuits, wheatena, wheaten grits, granose.

Vegetables: Most fresh varieties well boiled. Spinach, boiled onion, brussels sprouts, cauliflower, salads with oil, lettuce, asparagus, tomatoes, salsify, celery, cabbage. Take two teaspoonfuls of best olive oil mixed with fresh vegetables.

Desserts: Figs, prunes, tamarinds, apples, baked apples, oranges or grapefruit (on rising), melons, grapes, raisins, stewed fruits, honey or treacle, blackberries, strawberries, huckleberries, pears, peaches, cherries, plums. Fruit is more active if eaten before or between meals.

Beverages: Glass of water, preferably hot, drunk on arising (add salt to taste). Pure water in plenty, black coffee, cocoa, lemonade, beer, ale, cider, unfermented grape juice. Mineral waters: Richfield Springs, Crab Orchard, Bedford, Saratoga, Hunyadi, Carlsbad, Rubinat, Friedrichshall, Kissingen, Villacabras, Puellna.

Stimulants: None.

FORBIDDEN:

Eggs in every form, milk, milk puddings, sago, tapioca, whole or ground rice, farola, semolina, corn flour and all other starchy foods, except those mentioned above, with and without milk; all sweet cakes, pastry and Assam or Ceylon tea; condiments, pickles and curries, fried or stewed foods, twice-cooked dishes and smoked, pickled, cured or potted meats and fish, salt meats, salt nuts, pineapples, bananas, new bread.

GENERAL RULES:

Use foods that leave a bulky residue to stimulate the muscular coat of the intestines. Cooked fruits should not contain much sugar. Neutralize with bicarbonate of soda. Drink abundant water, with or between meals, before rising and again on retiring to bed. After eating fruit, it is well to drink a glass of water, as this increases the value of the fruit, especially when the fruit is eaten between meals. It is well, also, when perspiration has been free, that you should replace the fluid lost by consuming a larger quantity of water than usual. Take regular outdoor exercise.

Never neglect a call of nature. Make a point of encouraging an action of the bowels at a certain time each day, and allow nothing to interfere with that duty. Avoid all tight bands, etc., about the waist. Be regular in food, rest, work and play, as regularity is the essence of the healthy life.

1. Insist upon the patient taking a full quantity of fluid—for an adult at least two and a half to three pints daily. Many women suffering from constipation will be found to take only one to one and a quarter pints daily. Their constipation often depends upon this alone, and yields when a sufficient quantity of liquid is taken.

2. This fluid may well include a tumblerful of water, cold or hot, immediately on getting out of bed in the morning, and a tumbler of hot water at bedtime. Where hot water, with or without a saline aperient, is ordered to be taken in the morning, the effect is often enhanced if it be slowly sipped while dressing.

3. Absolutely forbid taking meat with tea; insist upon fruit or jam, or honey, or treacle with farinaceous foods (*e.g.*, blanchmange or rice), and order every night or early morning a full quantity of such fruit as stewed figs, baked apples, Normandy pippins, bananas, etc.

4. The body should be warmly clothed to avoid the skin getting

chilled, and the feet kept warm and dry by thick boots, with cork or asbestos insoles or brown paper socks.

5. Tepid or cold sponging, followed by sharp friction with a rough towel and flesh glove, daily, to secure a vigorous action of the skin.

6. Abdominal massage for ten minutes before rising, every morning. This (which can readily be done by the patient) followed by the cold or hot water on rising, is often sufficient to produce a speedy evacuation.

7. Regular exercise, especially of those kinds which bring the abdominal muscles into play, such as golf and fencing. Skipping is also excellent.

8. Insist upon the habit of a regular hour every morning at which to solicit the bowels to act, whether there be desire or not.

Diabetes.—(Volume III, Chapter XII.)

ALLOWED:

Soups: Consommé of beef, veal, chicken, turtle, terrapin, oyster and clam without flour. Chowder without potatoes, mock turtle, mulligatawny, tomato, gumbo fillet, oxtail.

Fish: All kinds, also lobsters, oysters (rejecting soft parts), clams, terrapin, shrimp, crawfish, soft-shell crabs. If slight thirst, cod, mackerel, halibut. No sauces containing flour.

Meats: Preferably fat. Cooked in any way except with flour. Poultry, calf's head, kidneys, sweetbread, bacon, ham, tongue, sausage, hash without potatoes, pig's feet, tripe, eggs, all kinds of game (not breaded).

Relishes: Pickles, radishes, sardines, anchovies, celery, olives, fish roe, caviar, endives, cream cheese, milk curds.

Farinaceous: Jireh bread, Jireh gems, Jireh porridge, fried Jireh mush, Jireh wafers, Jireh griddle cakes, almond bread and cakes, charred bread, bran cakes, soya bread, rye bread, glutens, nut gluten biscuit. May occasionally substitute potatoes for bread. Substitute Jireh for flour in soups and gravies.

Vegetables: Truffles, lettuce, romaine, chicory, cucumbers, spinach, sorrel, beet tops, cauliflower, cabbage, brussels sprouts, dandelions, tomatoes, oyster plant, onions, string beans, watercresses, asparagus, artichoke, parsley, mushrooms, all kinds of herbs, sauerkraut, okra.

Fruits: Cranberry, whortleberry (black or bilberry), gooseberries, tangerines, mandarines. Occasionally sour cherries or an apple (Greenings, Stirling Castel and Pippins), lemons and grapes (sour), and grapefruit.

Nuts: Walnut, pecan, Brazil, butternuts, cocoanuts, almonds, hazel nuts and pine nuts.

Desserts: Coffee or lemon jelly, gelatin with wine, lemons, currants, cream custards, fruit jellies and ice cream sweetened with saccharin or glycerin. In cooking acid fruits, neutralize acidity with bicarbonate of soda or potash.

Various: Butter, eggs (boiled, poached, scrambled, fried, baked or curried, and as savory omelette), cream cheese, saccharin, saxon, calf's foot or gelatin jellies, without wines and sweetened with saccharin and not sugar; water ices, sweetened with saccharin.

Beverages: Tea and coffee without cream or sugar, buttermilk, kumiss, skimmed milk, plain soda. Mineral waters: alkaline and alkaline calcic, Saratoga, Poland, Waukesha, Bethesda, Highland, Londonderry Lithia, Buffalo Lithia, Hudor Lithia, Aquazon, Vichy, Apollinaris, Carlsbad, Ems and Marienbad.

Stimulants: Occasionally claret, Burgundy, Still Hock, sherry and whiskey (Mackie's Red Cross or B. B. Diabetic Whiskey) or brandy (Martell's, Hennessy's Three Star).

FORBIDDEN:

All foods in the above lists deleted by the physician and the following: All sweet or sparkling wines, ale, porter, stout and beer. All sweetened beverages, such as cocoa and milk, milk cocoa, coffee extracts. *Sugar must not be taken under any circumstances*; saccharin and saxon are excellent sugar substitutes. All sago, rice, arrow-root, barley, oatmeal, tapioca, macaroni, puddings and sugar-producing starches, corn flour, etc., and all preparations of starchy foods, such as bread and biscuits, except those mentioned above by name. All root vegetables—potatoes, carrots, parsnips, turnips, etc.; all beans, all peas and all sweet fruits, such as oranges, dates, prunes, watermelon, bananas, apricots, peaches and very ripe grapes. Milk in quantity, all whole or skimmed milk cheese, honey, jam and jellies, all preserved fruits, mustard, molasses, sirup, all pastry and sweet cakes, sweet wines, cordials, porter, lager beer, cider, sweets, ices, treacle.

GENERAL RULES:

Reduce to a minimum all starches and sugars; increase animal diet and fats. Avoid starchy or sugar condiments. Drink water freely to eliminate sugar. Substitute saccharin for sugar. A good general rule to follow in regard to diet is this: *When in doubt* order no food that is not specifically referred to by name among the items allowed and recommended in the first portion of this chart.

1. Regular daily exercise is extremely important, but fatigue should be avoided.

2. Flannel clothing next the skin always, most carefully guarding against "catching cold."

3. A calm, equable, regular life, with good hours, and without worry or excitement or overwork.

4. Regular action of the skin should be encouraged by tepid sponging, followed by skin friction, by warm breathing, massage, and Turkish baths.

It is usually the better practice gradually to lessen the carbohydrate foods until the sugar has disappeared, and afterwards tentatively reintroduce them, noting the effect of each addition.

Diarrhea.—(Volume III, Chapter III.)

ALLOWED:

Soups: Clam broth, oyster broth, mutton or chicken broth, carefully cleared of fat (may add egg), maltolleguminose soup.

Meats: Scraped beef or mutton, pounded raw meat, sweetbread, beef juice, liquid peptonoids, Mosquera's beef meal or jelly, panopepton, somatose, minced chicken.

Sea Food: Raw oysters, fish cooked in butter.

Eggs: Raw white of egg with water, albumin lemonade, poached or lightly boiled egg.

Farinaceous: Crackers, dry toast, macaroni, rice boiled with milk, arrowroot, tapioca, sago, milk toast, panada, barley mush, gruel boiled for two hours, flour-ball with milk. May add brandy or port wine to arrowroot or gruel.

Desserts: Junket, bread pudding, egg pudding, not sweet; hasty pudding with flour and milk.

Beverages: Acorn-cocoa made with water during acute stage, with milk later, sterilized or pasteurized milk with one-third lime water, peptonized milk, strong tea, zoolak, leguminose cocoa, lactic acid water, toast water, rice water, gum Arabic water, kephir

four days old, kumiss, egg lemonade. Mineral waters: Alleghany Springs, Manacea Water, Irondale Springs, W. Va.; Berkeley Springs, Bethesda Springs, Gettysburg Springs, Vittel, Wildungen, Bristol.

Stimulants: Claret, blackberry wine and blackberry brandy, whortleberry wine.

FORBIDDEN:

Oatmeal, wheaten grits, fresh breads, rich soups, vegetables, fried foods, fish, salt meats, lamb, veal, pork, brown or graham bread, fruits, nuts, pies, pastry, ice cream, ice water, sugars, sweets, custards, malt liquors, sweet wines.

GENERAL RULES:

If acute attack, stop all foods for about twelve hours. Avoid foods prone to fermentation and those that leave an undigested residue behind, thus causing intestinal irritation. Take food in small quantities and at regular intervals.

General Directions.—

1. Warmth and absolute rest in bed.
2. Warm clothing, especially to the abdomen.
3. The food should be given in small quantities, frequently; it is usually better given cold.
4. During convalescence, the food should be increased cautiously.

Dilatation of the Stomach.—(Volume III, Chapter II.)

ALLOWED:

Soups: Strained vegetable soups.

Fish: Raw, broiled or stewed oysters, broiled or boiled mackerel, rock, bass, trout or bluefish.

Meats: Boiled brains, boiled or broiled sweetbreads, raw scraped beef, broiled steak, roast beef, roast lamb, chops, boiled, broiled or roasted chicken, broiled or roasted squab, birds or turkey.

Eggs: Raw, soft-boiled, poached.

Farinaceous: Rice, cornstarch, sago, tapioca, arrowroot, hominy, grits, vermicelli, cream of wheat, stale wheat bread, toast, toasted crackers, cornbread, pulled bread, Zwieback.

Vegetables: Asparagus, spinach, peas, string beans, lima beans (best mashed and strained), potatoes (baked or mashed), turnips, carrots (mashed and strained), lettuce (without vinegar), cresses (without vinegar).

Fruits: Baked or stewed apples, stewed prunes.

Fatty Foods: Butter (small quantity), cream.

Desserts: Blancmange, custards.

Beverages: Take mainly between meals. Milk, malted milk, peptonized milk, milk flavored with tea, milk flavored with coffee, albumin water, water (not with meals).

FORBIDDEN:

Soups, fried foods, pork, veal, stews, hashes, corned meat, potted meat, liver, kidney, duck, goose, sausage, crabs, lobsters, preserved fish, smoked fish, salted fish, salmon, salt mackerel, sardines, cauliflower, celery, radishes, corn, cabbage, cucumber, tomatoes, sweet potatoes, beets, salads, hot bread or cakes, nuts, candies, pies, pastry, cheese, strong tea, strong coffee, alcoholic stimulants, ice water, ice cream.

Dyspepsia.—(Volume III, Chapter II.)

ALLOWED:

Soups: Small quantity. Clear soups or beef, mutton, oysters. A little vermicelli or tapioca may be boiled with these. Tomato soup, maltoleguminose soup.

Fish: Raw oysters, weakfish, whitefish, shad, cod, perch, trout, bass, smelt, fresh mackerel, whiting.

Meats: Meat juice, roasted or boiled beef, mutton, chicken, tripe, calf's head, venison, tongue, sweetbread, bacon, lamb chops, squab, roast partridge, woodcock, plover.

Eggs: Raw, soft-boiled, baked, poached, omelette, combined with chicken or oysters; dry toast or stale bread with eggs.

Farinaceous: Bread at least one day old; brown bread, toast, rye, gluten and graham bread, Zwieback, crackers, cream crackers, cracked wheat, rice, sago, tapioca, macaroni with toasted bread crumbs, arrowroot, cornmeal, hominy, wheaten grits, graham grits, vermicelli, rolled rye, rolled oats, rice cakes, browned rice, baked flour, granose, cerealine, aleuronat toast (especially if hyperacidity).

Vegetables: Best made into purée by passing through a colander or

mashing. Greens, spinach, lettuce, watercresses, French beans, sweet corn, green peas, asparagus, celery, artichokes, baked tomatoes, potatoes (but little).

Fruits: Orange juice, apple, melon, pineapple, grape, apricot, peach, greengage, stewed prunes, apples, figs, roasted banana.

Desserts: Fruit, rice, tapioca, Indian and farina puddings, custards (rice, snow, rennet, sponge cake, floating island), orange charlotte, gelatin creams, blancmange, baked and stewed apples and pears, baked bananas, grapes, and most ripe fruits if fresh. No rice sauces.

Beverages: Drinks should mostly be taken near the end of and between meals. Hot water before meals, milk, lime water, Vichy, weak tea (one-half ounce to the pint), kumiss, weak cocoa, peptonized cocoa and milk, buttermilk, malted milk, leguminose cocoa, whey, equal parts of whey and unfermented grape juice. Tea and coffee disagree in many cases. Mineral waters: Carbonic water, Congress, Hathorne, Ballston, Kissingen, Apollinaris, Poland, Highland Springs.

FORBIDDEN:

Rich soups and chowders, all fried food, hot or fresh bread, gridle cakes, doughnuts, veal, pork, liver, kidney, hashes, stews, pickled and corned meats, preserved and potted meats, turkey, goose, duck, sausage, salmon, salt mackerel, bluefish, sturgeon, eel, sardines, lobster, crab, cabbage, cauliflower, celery, radishes, cold slaw, cucumbers, parsnips, eggplant, turnips, carrots, squash, oyster plant, sweet potatoes, beets, pastry, pies, made dishes, nuts, dates, jams, dried and candied fruits, candies, ice cream, cheese, strong spirituous liquors, coffee and tea.

GENERAL RULES:

Small meals taken at regular intervals. Punctuality is of great importance. Masticate thoroughly; eat slowly and temperately. Fix regular hours for your meals; having fixed hours, keep to them. Chew every bite thoroughly and do not "nibble" between meals. Eat slowly. Leave business in the office. Never take tea with or immediately after dinner.

1. Be sure the teeth are sound, and in such number and condition as to ensure complete mastication. One or more tender teeth, which the owner dare not bite on, may alone lead to bolting of food and

consequent "indigestion." It is essential in every case to see not only that the teeth are sound, but that they are regularly used. Unused teeth usually get furred, coated and discolored.

2. All food should be eaten slowly, and completely masticated, and little or no fluid taken with meals.

3. Meals should be taken at regular hours (arranged for each case), and when possible, in pleasant company, without haste and under conditions free from hurry, worry or excitement. Each meal should, when possible, be preceded and followed by a short period of rest.

4. All food should be so cooked and served as to stimulate appetite and digestion.

5. When tea, coffee, tobacco and stimulants are allowed, explicit instructions should be given as to the kind and quantity, and when and how they shall be taken. For example, freshly made tea and milk, and tobacco may be harmless, where "stewed" strong tea and strong tobacco would be injurious.

6. Air, exercise, skin friction, Turkish baths, suitable clothing, the avoidance of fatigue, and care as to the bowels are essential in the rational treatment of dyspepsia.

Epilepsy.—(Volume III, Chapter VIII.)

ALLOWED:

BREAKFAST.—Any sort of ripe fresh fruit. Any cereal, as oatmeal, cracked wheat, rice, grits, etc. Soft-boiled, poached or scrambled eggs, or an omelet. Bread and butter. Any sort of plain crackers if desired. Milk, buttermilk, kumiss, milk and Vichy or eggshake. Phillip's digestible cocoa.

DINNER.—*Soups:* Any clear soup, consommé or bouillon, chicken, mutton, beef or oyster broth, vegetable purées. Avoid rich and highly seasoned soups.

Meats: Fish or meat, but not broth. Any sort of fresh fish, baked, boiled or broiled. Any sort of plain fresh meat, as roast beef, or mutton, chops or steak or fowl.

Vegetables: Potatoes, parsnips, celery, tomatoes, spinach, peas, string beans, asparagus, salsify, lettuce, squash, macaroni, rice, spaghetti, hominy.

Desserts: Fresh fruit, plain puddings or junket, ice cream or water ice.

SUPPER.—Bread and butter, cereals, stewed fruits, liquids, as for breakfast. If working or taking much exercise, eggs or oysters may be allowed; otherwise very plain suppers are to be preferred.

FORBIDDEN:

All fried foods, all rich and highly seasoned dishes, pastry, cake, candies, hot breads, all forms of alcohol, coffee and tea, pork. All foods known to disagree with the patient, and all indigestible articles, as pork, lobster, ham, and the like.

Fevers.—(Volume III, Chapter XI.)

ALLOWED:

Soups: Raw meat juice, clam broth, chicken broth, vegetable broths, mutton broth, broth with egg, broth of gelatin, beef tea, clear soups, fruit soup, albumin lemonade.

Eggs: Beaten up with water or stimulants, or immersed ten to fifteen minutes in water that has just ceased boiling.

Foods: Junket, peptonized milk, milk boiled with acid, malted milk, Mellin's food, Nestle's food, liquid peptonoids, zoolak, panopepton, somatose, flour ball with milk, milk toast, arrowroot, Indian meal gruel, oatmeal gruel, ground rice custard, Mosquera's beef meal, pounded raw meat, oysters; in convalescence, meat and calf's-foot jelly, peptonized milk, panopepton with crushed ice, Valentine's meat juice.

Beverages: Skimmed milk alone (one and one-half quarts to two and one-half quarts in twenty-four hours), buttermilk, whey, equal parts whey and unfermented grape juice, kumiss, barley water, rice water, toast water, jelly water, gum arabic water, plain soda, lemonade, fruit juice, egg lemonade, eggnog, cocoa. Mineral waters: Carbonic water, ozonized water, Vichy, Apollinaris, Seltzer, Poland, Highland Spring.

During Convalescence Add: Sago, tapioca, granose, cream of wheat, crackers, Zwieback, broths, thickened with crumbs; minced chicken, macaroni, farina, wine and beef jellies, baked apples, prunes, oranges, baked potato, creamed potato, sweetbread, broiled chop or steak.

Stimulants: As physician sees fit and symptoms demand.

FORBIDDEN:

All solid foods or fruit until the temperature has remained normal for ten days.

GENERAL RULES:

Mostly liquids in small quantities and often; partially digested food; never give anything that cannot pass through the mesh of a fine sieve; give more in the morning than in the evening. Loss of appetite should be respected in the acute stage. Utilize periods of remission.

Gonorrhea.—(Volume III, Chapter IX.)

ALLOWED:

Soups: Broths, oyster soup.

Fish: All kinds boiled. White sorts broiled.

Meats: Most kinds; poultry, game, etc.

Farinaceous: Brown or graham bread, gingerbread, oatmeal porridge, bran bread, bran pudding, whole-meal bread, cornbread, rye bread, shredded wheat biscuit, wheaten, wheaten grits, granose.

Vegetables: Most fresh varieties, well boiled. Spinach, boiled onion, brussels sprouts, cauliflower, lettuce, asparagus, tomatoes, celery, cabbage.

Beverages: Pure water in plenty, cocoa, lemonade, unfermented grape juice. Mineral waters: Richfield, 1 glass of carabaña water each morning, Poland, Highland Springs, Oak Orchard, Sharon, White Sulphur, Saratoga, Homburg, Kissingen, Royat.

FORBIDDEN:

Tea, coffee, spirituous liquors, stimulating beverages and foods, cheese, mustard, and highly seasoned articles of diet.

GENERAL RULES:

The consumption of water and a considerable quantity of mild beverages is recommended in the early stages of the disease. Very little food or drink should be taken before retiring at night. The member should be constantly cleansed by washing several times a day with cold water. When there is much discharge, a linen pad should be laid over the meatus. The hands must be washed each time after the member is handled. The disease may be said to be

cured not on cessation of the discharge, even though complete, but when examination of the urine by the medical attendant reveals no further signs of the disease. Coitus should not be permitted until this is the case. Violent bodily exertion, such as gymnastics, dancing, active sports, tennis, golf and cycling, much walking, and, above all, coitus must not be indulged in.

Gout.—(Volume III, Chapter XII.)

ALLOWED:

Soups: Fresh fish soups, vegetable broths, clear.

Fish: Raw oysters, fresh fish, boiled.

Meats: Fat bacon, boiled or broiled chicken, game (all sparingly).

Eggs: In moderation, raw or stirred in drinks.

Farinaceous: Cracked wheat, oatmeal, rice, sago, hominy, whole wheat bread or biscuits, rye bread, graham bread or rolls, crackers, dry toast, milk toast, macaroni.

Vegetables: Mashed potatoes, green peas, string beans, spinach, cabbage, cucumbers, cresses, lettuce, celery.

Desserts: Plain milk pudding, junket, rice and milk, sago and milk, stewed fruits (all without sugar).

Drinks: Weak tea (no sugar), milk, buttermilk, toast water, pure water, cold and hot.

FORBIDDEN:

Veal, pork, goose, duck, turkey; salted, dried, potted or preserved fish or meat (except fat bacon); eels, mackerel, crabs, salmon, lobster, eggs, rich soups, gravies, patties, tomatoes, sweet potatoes, asparagus, mushrooms, rhubarb, lemons, pickles, vinegar, fried or made dishes, rich puddings, spices, pies, pastry, sweet cheese, nuts, dried fruits, tobacco, coffee, cider, malt liquors, sweet wines, champagne.

GENERAL RULES:

Diet liberal and varied as possible; moderation in animal foods. Avoid sugars and fermented liquors; take moderately and carefully the starches and fats; strumous lithemic patients require a large proportion of fats.

1. Moderation in animal food, liberality in vegetables. The proportion of these must be adapted to each case.

2. Abundant fluid, of which plain hot water (for preference slowly sipped), night and morning, may form an important part.

3. Regular exercise. A gouty patient should walk daily not less than from three to four miles, unless there be reason to the contrary in the individual case. Gout, however, is not uncommon in those who take exercise freely, and the degree and kind of exercise must be carefully prescribed in each case.

4. Warm baths, tepid or cold sponging, skin friction, massage and Turkish baths.

5. Free action of the skin, kidneys and bowels, regular hours, warm clothing and the avoidance of fatigue are essential.

Hyperchlorhydria or Hyperacidity.—(Volume III, Chapter II.)

ALLOWED:

Fish: Sole, plaice and whiting.

Meats: Boiled or broiled brains, raw scraped beef, boiled or broiled beef, broiled steak, roast mutton, broiled chops, roast lamb, boiled, broiled or roasted chicken, broiled or roasted squab, roast turkey, broiled or roasted birds.

Eggs: Soft-boiled, poached or raw.

Farinaceous: Rice, cornstarch, sago, tapioca, arrowroot, hominy, grits, vermicelli, cream of wheat, stale wheat bread, toast, cornbread, pulled bread, Zwieback.

Fruits: Baked or stewed apples, stewed apricots, stewed peaches, stewed pears, stewed prunes.

Fatty Foods: Butter, cream, pure olive oil, grated cheese.

Beverages: Taken mainly between meals. Milk, buttermilk, malted milk, peptonized milk, milk with lime water, milk with Vichy, milk flavored with tea, milk flavored with coffee, kefir, kumiss, junket, whey, cocoa, albumin water, water (not with meals), hot water.

Desserts: Custards, jellies, gelatins, blancmange, sugar.

Mineral Waters: Vichy, Apollinaris, Poland, Lithia water, Congress, Hathorne, Carlsbad.

FORBIDDEN:

Soups, fried foods, pork, veal, stews, hashes, corned meat, potted meat, liver, kidney, duck, goose, sausage, crabs, lobsters, preserved fish, smoked fish, salmon, salt mackerel, sardines, cauliflower, celery, cocoa, radishes, cucumbers, sweet potatoes, beets, tomatoes, acid

fruits, salads, hot bread or cakes, nuts, candies, pies, pastry, cheese, strong tea, strong coffee, alcoholic stimulants, ice water, ice cream; all condiments and spices, mustard, pepper, vinegar, horseradish, ginger, curry, etc., must be forbidden.

Intestinal Dyspepsia.— (Ewald's Diet List) (Volume III, Chapters II-III.)

ALLOWED:

Soups: Small quantity. Clear soups of beef, mutton and oyster.

A little vermicelli or tapioca may be boiled with these. Cream pea soup, pea and tomato soup, hominy and bean soup, beef tea with yolk of egg.

Fish: Oysters and little neck clams in any form, except fried. Weak-fish, white fish, shad, cod, perch, trout, bass, smelt, mackerel, haddock, corvina, barracuda.

Meats: Meat juice, roast or broiled beef, mutton, chicken, tripe, calf's head, venison, tongue, sweetbread. No fatty meats or sauces.

Eggs: Raw, soft-boiled, poached, omelet combined with chicken or oyster. Eat dry toast or stale bread with eggs. May combine eggs with wine or brandy.

Farinaceous: Bread, at least one day old; brown bread, toast, rye, gluten and graham bread, Zwieback, crackers, cream and crackers, cracked wheat, rice, sago, cornmeal, hominy, wheaten grits, vermicelli, rolled rye, rice cakes, browned rice, baked flour.

Vegetables: Best made into purée by passing through a colander or mashing. Greens, spinach, lettuce, watercress, French beans, green peas, asparagus, celery, artichokes, potatoes (but little). All vegetables to be used sparingly and with caution.

Desserts: Rice, tapioca, Indian and farina puddings, custards (rice, snow, rennet, sponge cake, floating island), orange charlotte, gelatin creams, blancmange, baked or stewed apples and pears, grapes, and all ripe fruits (best stewed, but may have to avoid fruit entirely).

Beverages: Drinks should be mostly taken near the end of meals. Water one hour before meals, milk, lime water, weak tea (one-half ounce to the pint), kumiss, weak cocoa, peptonized cocoa and milk. Mineral waters are not specially recommended. Good claret or Burgundy diluted one-half with sterile water.

FORBIDDEN:

Rich soups and chowders, all fried foods, veal, pork, liver, kidney, hashes, stews, pickled and corned meats, preserved and potted meats, turkey, goose, duck, sausage, salmon, salt mackerel, bluefish, sturgeon, eels, shrimps, sardines, lobster, crabs, cabbage, cauliflower, cucumbers, parsnip, eggplant, turnips, carrots, squash, oyster plant, sweet potatoes, beets, pastry, pies, made dishes, nuts, dates, jams, dried and candied fruits, candies, cheese, whipped cream, ice cream and water ices, ice water, pancakes, potato cakes, pumpernickel, strong tea, malt liquors, sweet and effervescent wines, spirituous liquors, coffee.

GENERAL RULES:

Clean and disinfect the mouth before eating. Small meals taken at regular intervals. Punctuality is of great importance. Masticate thoroughly; eat slowly and temperately. Food lukewarm only. Rest before and after meals.

Malnutrition and Chronic Malaria.—(Volume III, Chapter XI.)

ALLOWED:

Soups: Thick soups, all kinds, all kinds rich broths, Irish stew.

Fish: Raw oysters, raw clams, escallops, flounder, whiting.

Meats: Roast beef, chopped or scraped meat, mutton, lamb, beef juice, roasted ham, broiled bacon, chicken, turkey and duck roasted, rare sirloin with claret.

Eggs: Raw, egg-flip, poached, soft-boiled, scrambled, omelet, eggnog and egg and milk.

Farinaceous: Bread and cakes, rice, hominy samp, crackers, corn-bread with egg, and cereals.

Vegetables: All kinds of ripe and well-cooked vegetables, as potatoes, spinach, young beans and peas, lettuce, celery, asparagus, tomatoes, beets, onions, turnip tops.

Desserts: Egg custards, egg-and-milk puddings, baked apples, baked pears, cakes and pies, ripe fruits, muskmelon.

Beverages: Pure spring water, Poland or Vichy water, fresh butter-milk, cream clabber and curds. Malt preparations. Manacea water with meals. Buffalo Lithia water, etc.

Stimulants: Brown stout, Burgundy, claret, port, sherry.

FORBIDDEN:

Pork and veal (no salt meats except ham), hashes, stews, thin soups,

cooked oysters or clams, pickles and spices, pastry and preserves, thick gravies and all made dishes, bananas and pineapples, cucumbers and artichokes.

GENERAL RULES:

Generous nutritious diet is important, readily and easily digested foods preferable, given in small quantities, and at regular intervals, cautioning patient to masticate thoroughly and eat slowly.

Nursing Mothers.—(Volume II, Chapter XI, and Chapter XV.)

ALLOWED:

Soups: Chicken, mutton, hough, oxtail, hare and broth.

Gruels: Oat, corn meal mush, barley flour (Allenbury's), farina and rice.

Fish: Haddock, flounder, sole, halibut, turbot.

Meats: Chicken, pigeon, lamb, mutton, steak (grilled), game.

Eggs: Soft-boiled, poached.

Farinaceous: Arrowroot, Allenbury's diet, rice, "porage oats," hominy, plasmon, oats, barley, wheaten meal, oatmeal, revalenta, brown bread, whole wheat bread, toast, milk toast.

Vegetables: Asparagus, stewed cucumber, Spanish onions (if boiled in four waters), turnip, carrot, parsnip, celery. The following vegetables are good, but must be stopped at once if the infant is griped or purged: potato, cabbage, sprouts, cauliflower, French beans, greens and spinach.

Fruits: Orange juice, apple, apricot, prune, banana (cooked only), fig, plum.

Beverages: Ovaltine, cocoa, China tea (infused for three minutes and poured off), buttermilk, barley water, sweet clabber, soda water and milk, cream (not separated), buttermilk with cream, Plasmon cocoa, Horlick's malted cocoa.

If the milk overflows, reduce the quantity of fluid at once to about half. If after two days there is still milk escaping between nursing periods, reduce still further, but do so very slowly until the overflow ceases. The quantity of fluid may then be gradually increased.

Stimulants: None.

FORBIDDEN:

Till nursing period is completed, these articles of food—tea and coffee, alcoholic beverages, such as porter, stout, beer, and all wines, rich sauces and gravies, sweet cakes, pastry, tomatoes and smoked meats and fish, pork, veal, all indigestible meats, stews, gravies, made dishes, rich desserts, pastries, etc., coffee, stimulants, acid fruits; above all, nurses should not be subjected to depressing mental or nervous influences.

Fats and animal foods must be taken in great moderation. If the infant shows signs of indigestion, avoid these entirely.

Fresh fruits and green vegetables should not be taken if the child has colic or diarrhea.

The following medicinal substances and drugs pass into the mother's milk, and may injure the child: belladonna, laudanum (opium), jalap and calomel (mercury). These should *never* be taken while nursing.

Rhubarb (medicinal), senna, sulphur, castor oil and bromid of potassium are also to be avoided as they are conveyed by the milk directly to the infant.

GENERAL RULES:

During the first three or four days after delivery, the diet should consist of liquid food made of cereal grains with a small allowance of animal broths. After the bowels have been thoroughly opened, begin to resume the normal diet. Allow tender beef, mutton, chicken, game, once a day with baked potatoes and green vegetables. Wine jelly, blancmange, and simple custards should constitute the desserts. At the end of ten days the regular meals should be given, consisting of the most nutritious and digestible substances. (Kumysgen will rapidly increase the quantity and quality of the milk.) Cocoa and chocolate may be used.

Neurasthenia and Nervous Prostration.—(Volume III, Chapter VIII.)

ALLOWED:

Soups: Bouillon, clam broth, mutton broth with beef peptonoids and beef juice.

Fish: Fresh fish, raw oysters, eels.

Meats: Beef, raw, underdone, scraped or pounded, chopped or ground, lamb chops, young poultry, game, sweetbread, Mos-

quera's beef meal and jelly, beef juice, liquid peptonoids, brains, liver, somatose, panopepton, Valentine's meat juice.

Eggs: Every way except fried. Beat with milk, whiskey or sherry.

Farinaceous: Stale or toasted rusk, crackers, rice, cracked wheat, Indian meal bread, with plenty of butter; oatmeal, malt extracts, hominy, mush, milk toast, cream of wheat.

Vegetables: Onions, tomatoes, string beans, spinach, asparagus, lettuce, celery, greens, peas, rice, well-cooked; baked potatoes.

Fats and Oils: Mutton, beef, butter, cream, olive and cod-liver oils, almonds, nuts and nut foods, nut butter, cake chocolate, somatose chocolate, bone marrow. (May assist digestion with pancreatin.)

Desserts: Tapioca and sago puddings, farina, floating island, custards, all fruits, cheese, butter-scotch, honey and milk, olives, junket, rice pudding, wine jelly.

Beverages: Ozonized water, carbonized water, hot water or hot Vichy water (one-half pint an hour before meals), lemonade, ginger ale, malt preparations, milk, cream, kumiss, zoolak, buttermilk, cocoa, chocolate. Mineral waters: alkali, iron and sulphur, Oak Orchard Spring, Richfield Springs, Lower Blue Lick, Green Brier, White Sulphur Springs, Red Sulphur Springs, Aix-la-Chapelle, Homburg, Franzensbad and Cheltenham.

FORBIDDEN:

The excessive use of farinaceous, sugary or starchy foods; pone, beets, pork, veal, hashes, salt fish, lobster, bluefish, turnips, carrots, fried potatoes, cucumbers, cabbage, parsnips, arrowroot, cornstarch, hot bread and cake, all fried foods, made dishes, gravies, most sweets, pies and pastry.

GENERAL RULES:

Eat as much as possible to digest, mostly fatty and nitrogenous foods. It is important to take food between meals and before going to bed. Do not have meals more than three hours apart. Indigestion dietary often necessary.

Obesity.—(Volume III, Chapter XII.)

ALLOWED:

Soups: Very little, if any. Chicken broth, oyster soup, clam broth, thin beef tea.

Fish: All kinds except salt varieties, salmon or bluefish.

Meats: Once a day only, lean beef, mutton, chicken, game, veal.

Eggs: Boiled and poached.

Farinaceous: A limited amount of dry toast, aerated bread, shredded wheat biscuit, gluten biscuits, beaten biscuits, Zwieback, Vienna rolls, soup sticks, crusts, graham gems, hoe cakes.

Vegetables (fresh): Asparagus, celery, cresses, cauliflower, greens, spinach, lettuce, white cabbage, tomatoes, string beans, stuffed peppers, radishes, very little if any potatoes.

Desserts: Cheese, grapes, oranges, cherries, lemons, currants, apples, peaches, berries, acid fruits, roasted fruits (little sugar).

Beverages: Limited quantity of water, buttermilk, tea, coffee (no sugar or milk), light wine diluted with Vichy. Mineral waters: Avon Springs, Richfield, Crab Orchard, Londonderry Lithia, Hunyadi, Carlsbad, Friedrichshall, Rubinat, Puellna, Villacabras. Continue for several weeks drinking one glass of Kissingen water thirty minutes after each meal one day, and one glass of Vichy water similarly the next. May use artificial compounds.

FORBIDDEN:

Soups, salmon, bluefish, eels, salt fish, pork, veal, sausages, made dishes, fats, potatoes, macaroni, oatmeal, hominy, spices, rice, beets, carrots, turnips, parsnips, puddings, pies, pastry, cakes, sugars, sweets, milk, cream, malt or spirituous liquors, beers, sweet wines, champagne.

GENERAL RULES:

Guard against sugars, starches and excess of fat-forming foods. A certain amount of fat with the food is essential. Let beginning impairment of the patient's strength be the sign to give more liberal diet. Diminish fluids, especially at meals, when not more than five ounces should be allowed. May substitute saccharin for sugar.

GENERAL DIRECTIONS:

1. An active life, with full occupation, short hours of sleep and the most vigorous exercise compatible with the physical condition. Cycling, horse exercise, skipping and fencing are especially valuable, but the form and amount of exercise must be carefully adapted to each case.

2. Free action of the bowels and skin, with regular Turkish baths.

3. Massage.

4. The entire quantity of liquid taken, of all kinds, should be moderate.

Pregnancy.— (Volume II, Chapter XI.)

ALLOWED:

Soups: Broths of mutton, chicken, oysters and clams; fish, when it agrees; raw oysters, raw clams.

Fish: All fresh fish and raw oysters.

Meats: Beef, mutton, chicken, game, eggs, butter, fats, sweetbreads, ham.

Eggs: Soft-boiled, poached, scrambled or raw with sherry or whiskey.

Farinaceous: Good wheat bread, cornbread, oatmeal, wheaten grits, rice, Carnrick's Soluble Food.

Vegetables: Baked potatoes, spinach, macaroni, greens, cresses, celery, green peas, lettuce, asparagus, green corn, oranges, grapes, stewed fruits.

Fruits: Thoroughly ripe apples, peaches, pears, plums, oranges, grapes.

Beverages: Water freely, cocoa, milk, tea and coffee.

Desserts: Sweet fruits, custards, calf's-foot jelly, fruit jam, jellies, baked apples, baked pears, prunes, marmalade, egg-and-milk pudding, honey, cake chocolate.

Nursing Mothers: During the first three or four days after delivery the diet should consist of liquid food made of cereal grains with a small allowance of animal broths. After the bowels have been thoroughly opened, begin to resume the normal diet. Allow tender beef, mutton, chicken, game, once a day with baked potatoes, and green vegetables. Wine jelly, blanchmange and simple custards should constitute the desserts. At the end of ten days the regular meals should be given, consisting of the most nutritious and digestible substances. (Kumysgen will rapidly increase the quantity and quality of the milk.) Cocoa and chocolate may be used.

FORBIDDEN:

Pork, veal, all indigestible meats, stew, gravies, made dishes, rich desserts, pastries, etc., coffee, stimulants, acid fruits; above all,

nurses should not be subjected to depressing mental or nervous influences.

GENERAL RULES:

Generous nutritious diet is important. Readily digested food should be given often and in small quantities. If patient is fat, lessen hydrocarbons and increase proteins; if thin and poorly nourished, give more starches and fats.

Rheumatic Fever.—(Volume III, Chapter XII.)

ALLOWED:

Soups: Clear soups, vegetable soups, clam and oyster broths.

Fish: Fresh fish, whiting, haddock and flounder, raw oysters.

Meats (to be taken once a day only, white kinds mostly): Mutton, chicken, ham, bacon, underdone roasts, sweetbread, pigeon, brains, pig's feet, venison, lamb chops, game, boiled fat bacon or boiled ham sparingly.

Eggs (in moderation): Whites of eggs, raw, stirred in drink.

Farinaceous (small quantities): Toast, stale bread, bread from whole wheat, rye bread, milk toast, rice, Zwieback, graham flakes, rye gems, soup sticks, crackers, hominy, cream of wheat, macaroni, shredded wheat biscuits, granose.

Vegetables (fresh green varieties): Celery, lettuce, watercress, cucumbers, onion, cabbage, salads, a little baked potato, young peas, string beans, spinach.

Fruits: May be taken if cooked. Stewed apples, plums, apricots and peaches, roasted banana or apple. Stewed pears may also be taken if ripe, but not overripe.

Desserts: Oranges, lemons, cranberries, tart apples, apricots, peaches, cherries, jellies, blanchmange, honey, ices (not after meals), stewed or roasted fruit (prepared with but little sugar).

Beverages: Water plentifully, plain soda, milk, buttermilk, zoolak, weak tea or coffee (no sugar), toast water, lime juice, lemonade. Mineral waters: Saratoga Vichy, Berkeley, Hot Springs, Va.; lithia waters, Crab Orchard, Bethesda, Carlsbad, Friedrichshall, Puellna, Villacabras, Marienbad.

Stimulants: To be given in exceptional cases only. Moselle, Light Hock, Bordeaux, in small quantities, and diluted whiskey.

FORBIDDEN:

Rich soups, hard-boiled eggs, fried and made dishes, entrées,

pickles, spices, veal, turkey, duck, goose, salmon, lobster, crab, preserved, dried and salt meats, salt fish, pickled pork, asparagus, peas, beans, beets, parsnips, turnips, vinegar, tomatoes, mushrooms, patties, new bread, cheese, sweets, omelets, grapes, pears, plums, strawberries, rhubarb, cider, sweet wines and malt liquors, nuts and coffee.

GENERAL RULES:

Diet liberal and varied as possible; moderation in animal foods. Avoid sugars and fermented liquors; take moderately and carefully the starches and fats.

Diet of School Children.—(Volume II, Chapter XI.)

ALLOWED:

Soups: Chicken, mutton, clear, hough and hare. Only a small quantity of soup—a few spoonfuls should be given.

Fish: Whiting, haddock, flounder, plaice, sole, halibut, turbot, trout, cod and mackerel. These may be fried, boiled, steamed or grilled. Herring and salmon should be boiled. It is of great importance to see that all fish are fresh. A good test is the vivid redness of the gills, a clear, full eye and a firm body.

Meats: Beef (roasted, boiled, steamed, grilled or baked), mutton, chicken, pigeon, turkey, rabbit, and if not “high” or tainted, pheasant or black game. Cook by boiling, roasting, grilling, steaming or baking. Do not fry or stew any of them. Additional for children over 13 years; a little bacon, meat puddings, sausages and hashes may be allowed in small quantities.

Eggs: In any style.

Farinaceous: Porridge of oatmeal, plasmon oats, porage oats or wheaten meal. Milk puddings of rice (whole, plain boiled, baked with milk and ground), sago, tapioca, semolina, farola, farina, arrowroot, corn flour, barley (whole, steamed with muscatel or valencia raisins), barley meal and flour.

Vegetables: Asparagus, onions, celery, potatoes, cabbage, cauliflower, brussels sprouts, greens, French beans, broad beans, green peas, spinach, turnips, carrots, parsnips, radishes, lettuce, mustard and cress, cucumbers (if stewed), beetroot, artichokes, leeks, sweet potatoes, tomatoes, vegetable marrow and rhubarb.

Fruits: Peaches, apricots, plums, raspberries, blackberries (brambles), strawberries, gooseberries, prunes, apples, cherries, pears,

grapes, melons and watermelons, dates, figs and the juice of oranges and tangerines (pomelo).

Sweets: Chocolate (plain and milk), maple sugar, home-made toffee and tablet, preserved fruits, fruit sirups (genuine), golden sirup, molasses (treacle), jams, jellies and honey.

Various: Butter, gelatin and calves'-foot jellies (without wine), plain cake, gingerbread, custards, eggs, bread pudding and plain steamed puddings.

Beverages: Until the seventh year give water, milk, buttermilk, "sauerin," and occasionally a little Oxyqua-Mackay, soda or potash water. At the seventh year there may be added cocoa and weak ovaltine or chocolate. Tea and coffee should not be given before the thirteenth year or later.

FORBIDDEN:

All pickles, salads, condiments, "dressing" of fowl, sauces, rich gravies, kidneys, liver, tripe, oatcakes, rich cakes and pastry; salted, pickled or preserved meats, fish or fruits; all unripe or overripe fruits, bananas, nuts, fruits with large seeds; the skin of fruits, vegetables and poultry; all shellfish, cheese, aerated waters and *all* alcoholic beverages.

GENERAL RULES:

Insist on plenty of time being taken for meals. See that food is thoroughly masticated. In hot weather do not give so much food, but give more water. Have meals presented with absolute regularity and be careful to see that the child or children are punctual. Encourage the child to wash the teeth carefully after each meal. Do not allow nibbling between meals, but give the child abundance of milk between the meals if he asks for food.

Ulcer of the Stomach.—(Volume III, Chapter II.)

ALLOWED:

FIRST WEEK.—

Soups: Mutton, chicken, beef, oysters, bouillon, flour.

Eggs: Raw or in bouillon.

Beverages: Milk with Vichy, milk with lime water.

SECOND WEEK.—

Soups: Mutton, chicken, beef, oyster, bouillon, flour, rice, barley.

Eggs: Raw or in bouillon, soft-boiled.

Farinaceous: Bread, milk toast, rice served in milk or bouillon, tapioca served in milk or bouillon.

Beverages: Milk with Vichy or lime water.

THIRD WEEK.—

Soups: Mutton, chicken, beef, oyster, bouillon, tapioca, rice, barley, clam, vermicelli.

Fish: Raw, broiled or stewed oysters, boiled rock or bass.

Meats: Brains boiled, sweetbreads boiled, broiled, beef raw, scraped, broiled steak, lamb chops, chicken, boiled, broiled, squab broiled.

Eggs: Raw, soft-boiled.

Farinaceous: Rice, cornstarch, sago, tapioca, arrowroot, grits, cream of wheat, toast, Zwieback.

Fatty Foods: Butter.

Beverages: Milk, malted milk, peptonized milk, milk with Vichy, milk with lime water, milk with tea, milk in coffee, kefir, kumiss, junket, whey, cocoa, albumin water, Apollinaris.

FOURTH WEEK.—

Soups: Mutton, chicken, beef, oyster, bouillon, rice, tapioca, barley, vermicelli, clam.

Fish: Raw, broiled or stewed oysters, broiled or boiled mackerel, rock, bass, trout or bluefish.

Meats: Boiled brains, boiled or broiled sweetbreads, raw, scraped, boiled or broiled beef, broiled steak, roast beef, roast mutton, broiled mutton chops, roast lamb, lamb chops, boiled, broiled or roasted chicken, broiled or roasted squab or other birds.

Eggs: Raw, soft-boiled, poached.

Farinaceous: Rice, cornstarch, sago, tapioca, arrowroot, hominy, grits, vermicelli, cream of wheat, stale wheat bread, toast, cornbread, pulled bread, Zwieback.

Vegetables: Asparagus, spinach, peas (mashed and strained), potatoes (baked or mashed), turnips, carrots (mashed and strained).

Fatty Foods: Butter, cream, pure olive oil.

Desserts: Blancmange, custards, rice pudding, tapioca pudding, bread pudding.

Beverages: Milk, buttermilk, malted milk, peptonized milk, milk with lime water, milk with Vichy, milk flavored with tea, milk flavored with coffee, kefir, kumiss, junket, whey, cocoa, albumin water, water (not with meals), hot water, grape juice. Mineral waters: Vichy, Apollinaris, Poland, Carlsbad.

MADAH REDUCING DIETARIES¹

FOR DECEMBER, JANUARY AND FEBRUARY

MONDAY

*Breakfast:*² Fresh or stewed fruit; twice a week boiled or poached eggs; tea or coffee without cream or milk; no fluids with meals.

Lunch: Minced turkey; fruit salad; stewed prunes.

Dinner: Raw oysters; roast turkey, with cranberry sauce; string beans; salad Romaine; fruit.

TUESDAY

Lunch: Broiled lobster; cold fowl, with any relish; stuffed eggs; sliced oranges.

Dinner: Mussels (Mariniere) or fish in season; Dolmas (mutton, Turkish fashion); broiled mushrooms; roast fowl with Aspic jelly; cold slaw (boiled dressing); stewed apples with lemon and cinnamon flavoring.

WEDNESDAY

Lunch: Steamed oysters; hashed venison in ramekins; apple and celery salad.

Dinner: Clam cocktails; fish; venison steak, with Aspic jelly, truffled; French beans; grapefruit salad.

THURSDAY

Lunch: Clam cocktails; broiled lamb chops; stewed celery; sliced apples with prunes.

Dinner: Oysters; fish; roast guinea-fowl, with pickled walnuts; mashed turnips; pineapple salad; gelatin (lemon flavor).

FRIDAY

Lunch: Lobster salad; poached eggs, with purée of sprouts; apple sauce.

Dinner: Oysters; fish; boiled tongue, with tomato sauce; roast pheasant, quince sauce; Brussels sprouts; apple soufflé.

SATURDAY

Lunch: Hashed veal (klopps); stewed carrots and turnips cut in dice; sliced oranges.

Dinner: Clams on the half shell (with any relish); baked fish; roast veal; macedoine of vegetables; lettuce salad with egg (diet dressing); fruit salad.

SUNDAY

Lunch: Boiled codfish, tomato sauce; cold duck; celery and apple salad; stewed fruit (in season).

Dinner: Oysters; broiled fish (in season); barsch (duck, Polish style); cauliflower; sliced Hawaiian pineapple.

MONDAY

Lunch: Broiled sweetbreads, with stewed celery; quail; endives; grapefruit.

Dinner: Oysters; fish; hare (with sauerkraut); salsify; salad; fruit.

TUESDAY

Lunch: Poached eggs, with purée of turnip; cold partridge; cold slaw; stewed pears.

Dinner: Oyster cocktail; steamed fish; partridges in cabbage; artichokes (vinai-grette); stewed plums.

WEDNESDAY

Lunch: Olives; celery; radishes; cold beef, with horse-radish; baked or steamed apples, flavored with lemon.

Dinner: Oysters or clams; broiled chicken giblets; filet of beef; purée of celery root; fruit salad.

¹ Madah Reducing Dietaries are taken from "Eat and Grow Thin," by Vance Thompson, and copyrighted by E. P. Dutton and Company, Publishers. They are printed here by permission.

² Light breakfast as above each day.

FOR MARCH, APRIL AND MAY

MONDAY

*Breakfast:*¹ Fresh or stewed fruit; twice a week boiled or poached eggs; tea or coffee without cream or milk; no fluids with meals.

Lunch: Olives; celery; minced chicken with mushrooms; pineapple salad.

Dinner: Oyster cocktails; fish (in season); boiled or broiled chicken; parsnips and onions; salad Romaine; spiced fruit.

TUESDAY

Lunch: Deviled eggs on asparagus tips; cold roast lamb, with mint or tomato jelly; salad; mandarins.

Dinner: Broiled shad; roast lamb, with mint sauce; Brussels sprouts; tomatoes and cucumbers (diet dressing); strawberry water ice (sweetened with saccharin).

WEDNESDAY

Lunch: Broiled calves' liver, with string beans; cold duckling; tomato and water-cress salad; fruit.

Dinner: Broiled king fish; calves' brains, with truffles; roast green duckling, stuffed with olives and celery; eggplant (Turkish style); fruit.

THURSDAY

Lunch: Scallops, with chili sauce; smoked minced beef with eggs; strawberries.

Dinner: Soft-shell crabs; broiled lambs' kidneys, with chicken giblets; boiled corned beef, with cabbage; lemon gelatin.

FRIDAY

Lunch: Kipperd herring; minced veal with dropped eggs; fruit.

Dinner: Shad; roast veal; cauliflower; tomato sauce; broiled mushrooms; compote of stewed fruit.

SATURDAY

Lunch: Lambs' kidney, with onions; vegetable salad (Harlequin); stewed pears.

Dinner: Clams on half shell; broiled spring chicken; asparagus; salad; fruit.

SUNDAY

Lunch: Cold lamb; lettuce and egg salad; sliced oranges and pineapple.

Dinner: Boiled cod steak (any fish relish); leg of spring lamb; purée of turnips; artichokes (vinaigrette); fruit.

MONDAY

Lunch: Dropped eggs, with purée of cauliflower; fish salad; fruit.

Dinner: Fish; squab or pigeons; purée of spinach; Russian salad; fruit.

TUESDAY

Lunch: Russian salad, boiled dressing (as hors d'œuvre); roast pigeon, with stewed celery; fruit.

Dinner: Fish or crab-flakes; filet jardiniere; asparagus tips; sauerkraut salad; fruit.

WEDNESDAY

Lunch: Cold chicken, with meat jelly; stewed carrots and turnips (diced); fruit.

Dinner: Filet of weakfish; broiled calves' brains, with purée of celery; roast chicken, with truffles; eggplant, tomato sauce; fruit salad.

¹ Light breakfast as above each day.

FOR JUNE, JULY AND AUGUST

MONDAY

*Breakfast:*¹ Fresh or stewed fruit; twice a week boiled or poached eggs; tea or coffee without cream or milk; no fluids with meals.

Lunch: Cold roast beef, with olives and any relish; chicken salad; raspberries.

Dinner: Fish; roast sirloin of beef; string beans; stewed tomatoes; chicken salad (use the boiled dressing); fruit water ice.

TUESDAY

Lunch: Olives; radishes; cold tongue; purée of spinach; iced tea with sliced orange.

Dinner: Fish; broiled or steamed spring chicken; asparagus; egg and lettuce salad; strawberries.

WEDNESDAY

Lunch: Poached eggs, purée of onion; cold lamb; sliced cucumbers, with green peppers; fruit.

Dinner: Fish; roast lamb; boiled beet-tops, with hard-boiled egg; tomato salad; stewed rhubarb.

THURSDAY

Lunch: Young onions; lamb chops; tomato and lettuce salad; cantaloupe frappé; iced tea with lemon.

Dinner: Broiled smelts; veal loaf, with new cabbage (boiled); salad of green beans and chopped carrots (cooked); melon.

FRIDAY

Lunch: Stuffed eggs, with tomato sauce; cold tongue (with relish); blackberries; iced tea.

Dinner: Fish; broiled tenderloin steak, with kidneys; purée of spinach; beets; pineapple, sliced.

SATURDAY

Lunch: Broiled lambs' fries, with string beans; chicken salad; sliced peaches.

Dinner: Fish; roast capon, with asparagus tips; cauliflower with tomato salad, with cress; huckleberries.

SUNDAY

Lunch: Clams on half shell; minced lamb; vegetable salad; stewed berries.

Dinner: Fish; broiled chicken giblets, with mushrooms; roast lamb, with mint sauce; endives; strawberry ice.

MONDAY

Lunch: Calves' brains, with tomato sauce; asparagus salad; huckleberry gelatin.

Dinner: Fish; boiled corned beef, with new cabbage and onions; stewed celery; tomato gelatin, with lettuce and egg; blackberries.

TUESDAY

Lunch: Shrimp salad; veal hash; raspberries and currants.

Dinner: Fish; veal cutlets (cut very thin and slowly broiled); boiled beets with onions; pineapple salad on lettuce hearts.

WEDNESDAY

Lunch: Lamb chops or steak; purée of lettuce; chicory or dandelion salad; fruit.

Dinner: Baked fish; sweetbreads, with chopped, boiled carrots; cold tongue, tomato sauce; sliced cucumbers, diet dressing; peaches.

¹ Light breakfast as above each day.

FOR SEPTEMBER, OCTOBER AND NOVEMBER

MONDAY

- Breakfast:*¹ Fresh or stewed fruit; twice a week boiled or poached eggs; tea or coffee without cream or milk; no fluids with meals.
- Lunch:* Steamed oysters; cold corned beef, with horse-radish; stewed prunes.
- Dinner:* Oysters; lobster; corned beef and cabbage; spinach with egg; stewed apples.

TUESDAY

- Lunch:* Stuffed eggs, with hot tomato sauce; cold mutton, Aspic jelly; melon.
- Dinner:* Broiled cod, with green peppers; saddle of mutton, caper sauce; squash boiled with young onions; endive salad; baked pears, spiced.

WEDNESDAY

- Lunch:* Cold veal (chili sauce); broiled calves' liver, with boiled lettuce; stewed apples and pears.
- Dinner:* Boiled haddock; calves' head, sauce vinaigrette; roast veal; beets; cauliflower salad; sliced peaches.

THURSDAY

- Lunch:* Cold goose; chicory salad; grapefruit.
- Dinner:* Oysters; fish; roast goose, with apple sauce; boiled onions and carrots; green peppers, stuffed with chopped beans (diet dressing); melon.

FRIDAY

- Lunch:* Hamburger steak with onions; celery and apple salad; sliced oranges.
- Dinner:* Oysters; baked liver, with onions; green beans, with broiled tomatoes' purée of Chicory; lobster salad; baked apples.

SATURDAY

- Lunch:* Steamed oysters; cold turkey, with cranberry sauce; stewed peaches.
- Dinner:* Clams; fish; roast turkey, cranberry sauce; purée of cauliflower; sliced tongue and tomato salad; fruit.

SUNDAY

- Lunch:* Tenderloin steak; shrimp salad; apple soufflé.
- Dinner:* Fish; hashed turkey, with mushrooms; vegetable salad; stewed fruit.

MONDAY

- Lunch:* Broiled mushrooms; cold game; meat jelly, with hard-boiled eggs; watermelon.
- Dinner:* Oysters; fish; wild rabbit or hare; boiled chicory (cooked like spinach); tomato salad; apricots.

TUESDAY

- Lunch:* Sweetbreads; stuffed olives; cold roast goose; stewed pears.
- Dinner:* Oysters; fish; roast goose; mashed turnips; escarole salad; peach soufflé.

WEDNESDAY

- Lunch:* Hashed beef, with onions and tomato sauce; eggplant; grapefruit salad.
- Dinner:* Broiled salmon; boiled beef with spinach; string beans; purée of Scotch chard; apple soufflé.

¹ Light breakfast as above each day.

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